...ering
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...cents
...per year

Engineering
News-Record

Bare Cupboards

NEWS from several quarters indicates that some manufacturers cannot make immediate delivery of orders. Stocks are badly depleted. Reason: Hand-to-mouth buying during the past few years has encouraged small inventories; and, some disastrous experiences with surplus stocks during the depression of 1920-21 have made manufacturers over-cautious.

• • • This condition is of vital concern to the constructor. In many instances he, like Micawber, is "waiting for something to turn up." He figures that the time to purchase his new plant and machines is after the construction-volume curve has turned upward. But may that not be too late? It will be, if he finds that the manufacturers' cupboards are bare.

• • • Past experience indicates that the construction-volume curve moves with precipitous alacrity. In 1922, a 225 per cent increase occurred in three months. Again, in 1925, even after a steady rise for several years, it jumped over 100 per cent within nine months. The first ten months of 1928 showed a 75 per cent increase. From present levels it requires only a 30 per cent jump to reach the trend line that has prevailed since the war, and which is still far below many of the peaks. Judging by past experience an unprecedented rise is more than a possibility.

• • • Wise constructors are planning now against this possibility. Perfected organizations and breakdown-proof equipment alone can insure their profits. Depleted manufacturers' stocks are a warning.

August 13, 1931

McGraw-Hill
Publishing
Company, Inc.

The Dallas Gas Company Building

Dallas, Texas

Architects: Lange and Witchell

Structural Engineers: Gardner and Howe

General Contractors: Jopling Construction Company

•

Framework of BETHLEHEM SECTIONS

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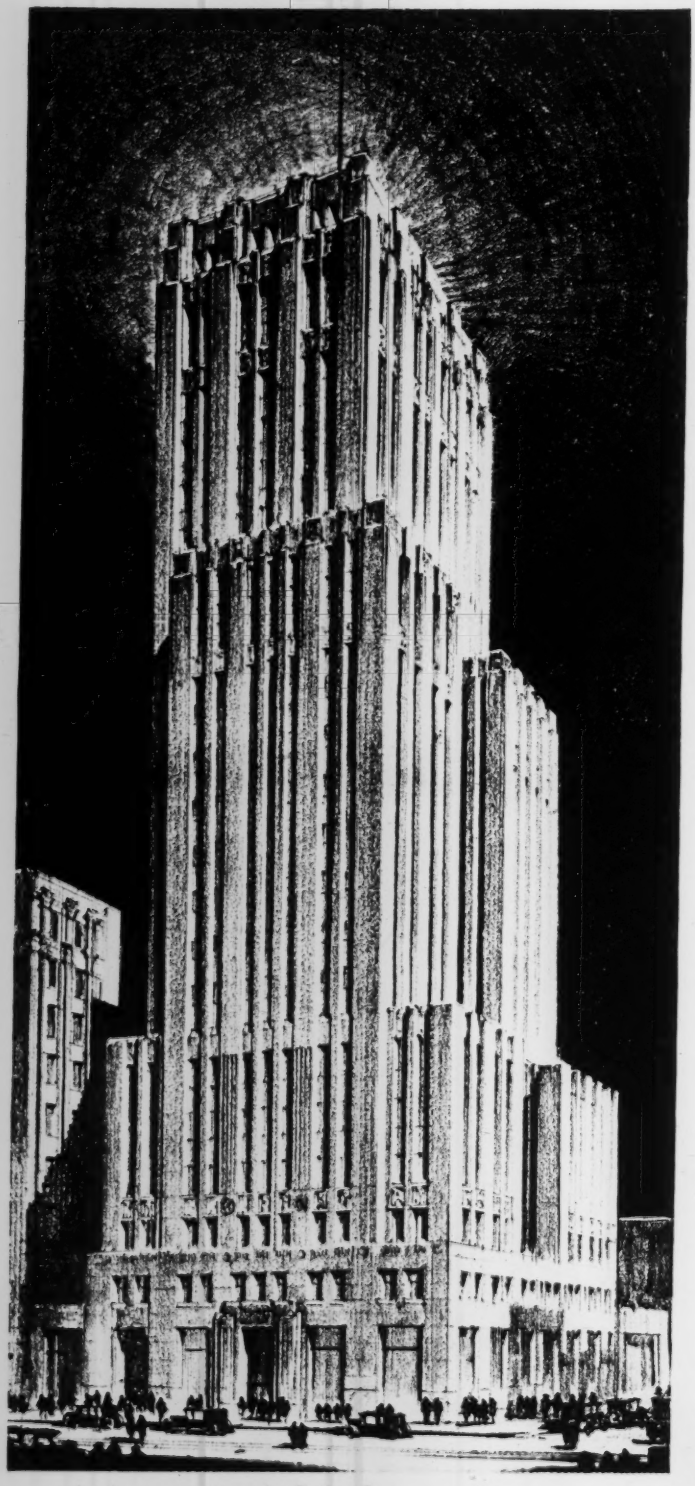

At the present time the Dallas Gas Company Building is 13 stories high. Provision has been made for an ultimate height of 23 stories, as shown above.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis, Dallas, Houston

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BETHLEHEM STEEL

BETHLEHEM

ENGINEERING NEWS-RECORD

A WEEKLY JOURNAL OF CIVIL ENGINEERING AND CONSTRUCTION PRACTICE

Volume 107 ✦ A McGraw-Hill Publication—Established 1874 ✦ Number 7

F. E. Schmitt, Editor

AUGUST 13, 1931

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Not Encouraging

OFFICIAL STATEMENTS from Washington about the public-building program are discouraging. A total of $300,000,000 of contracts for public buildings will have been let by fall, say the government spokesmen. The fact is that most of the amount has already been let, and adding the remainder will contribute only a small item to the volume of employment. In view of the great amount of idleness that is likely to be with us next winter and the severe distress it is sure to entail because of the fact that millions of workers have been without income for a long time, the rate of progress in getting work going on public buildings is desperately slow. Under the circumstances the administration is either cold-blooded or childishly naïve in citing the public-building work as a factor in coping with the emergency that confronts the country. If public works are to be made of any real service in relieving the winter's threat, they must be increased in vastly larger proportion than anything yet proposed by the government, and they must be pushed forward with an energy and an intelligence proportioned to the seriousness of the situation. All the indications are that our powerful national machinery is to be left unutilized in fighting the aftermath of the depression. This is anything but an encouraging prospect.

Engineers in Russia

AN UNUSUALLY CLEAR exposition of the problems of American engineers in Russia is given in the comment by John Carmody, editor of *Factory and Industrial Management,* published in this issue. Mr. Carmody is a keen observer and is gifted with remarkable ability to put his finger on the salient features of what he sees. He was sent to Russia by the McGraw-Hill Publishing Company to make a study of industrial conditions for the information and guidance of the papers of the house. Because of Mr. Carmody's ability as an observer what he has to say of Russian conditions is much more penetrating than would be similar comment from a casual observer. Certain facts stand out in his comment: Russia is no different from any other country in that the personality of the individual counts most in making his success or failure. The engineer who stands the best chance of making a success of his stay in Russia is the one who is teacher as well as technician. And, finally, Russia is no place for the man who lacks enthusiasm for his work, the job-sitter or the grouch. The engineer who cannot get along with his fellows here has less hope of doing so in Russia, where he must work under the handicap of a strange language, difficult living conditions and an almost complete ignorance of what we here in America consider the most elementary construction practices. Further, while the leaders in Russia appreciate the need for foreign technicians, the same is not true all the way down the line. Human nature crops out there as elsewhere. In many instances the foreign engineers are looked upon as interlopers, and the ordinary difficulties of their work are made doubly hard by the antagonism of their associates. Enthusiasm, broad technical training and executive ability of a high order are needed by the engineer who would succeed in Russia.

A Foundation Lesson

CYLINDER PILES received an unusual test in constructing the U. S. Assay Office foundations described in this issue. No condition more unsuited to this type of foundation could have been anticipated than the buried stone-filled timber cribs anchored by numerous wood piles that occupied nearly all of the foundation site. It is astonishing that steel cylinders, even of the greater shell thickness finally adopted, could have been driven at all. As it was, the mortality from destroyed piles was enormous. Two lessons present themselves in this record of experience. One is that preliminary exploration of foundation sites may never safely be neglected. In this instance conditions required the designers to be contented with a few borings skirting the foundation area. How inadequate these were to provide information of underground conditions was tragically apparent as soon as the first cylinders were excavated. The more important disclosures were, however, that the cylinders could be completely wrecked under ground without giving evidence of failure at the surface or by unusual behavior in driving, and that failure could occur from a variety of causes, some of which seemed insignificant. The record of these causes given in the article in this issue is a definite help to foundation engineers in anticipating the requirements of cylinder weight and strength.

Patching Pavements

PAVEMENT patching, one of the most important duties of highway engineers, is still neglected in many localities. Like all repair work, it lacks the interest and incentive of new work. Not infrequently it is left to local maintenance men ignorant of the problems involved in getting a satisfactory patch. Moreover, the work must be done under difficulties, generally in the face of dense traffic. Such neglect of pavement patching shows a lack of appreciation of its importance not only to the traveling public, who suffer much real loss through damaged cars, but also to the highway program of the state, county or city. The difference between a well-patched and a poorly patched pavement may amount to the price of a new pavement within a few years, usually at the expense of some other street or highway. This is true because careful patching may extend the life of a pavement over a number of years, whereas careless patching will, like the new cloth in the old garment, only make conditions worse. The added life is worth many times the slight increase in

cost of skilled over unskilled work in patching. Pavement repair is a subject entitled to special study in every highway organization.

Engineering in Far Places

MANY interesting and valuable glimpses at the problems, methods and working conditions met by brother engineers in strange countries of the world have been given in the series of articles by Prof. H. E. Babbitt, brought to a close in this issue. Readers who have followed the series since its inception have had the benefit of the keen observation of a man well versed in the intricacies of the profession, who is highly fitted to pass on his findings to others through the medium of the printed word. The combination of qualities is as rare as it is fortunate, and it has resulted in a notable series of articles. Considering the many points of difference in practice, the variations in language and in customs and the necessity of drawing accurate general conclusions from a necessarily limited viewpoint, both as regards time and space, the fidelity and vividness of the author's work is remarkable. Congratulations are due Professor Babbitt for a difficult job well done.

A Power Scandal

THE SCANDAL that has raged around the Beauharnois power development on the St. Lawrence River during the past few weeks does serious damage to the cause of private development of power resources. Canada has been agog with the revelations of the way in which the promoters of the power project contributed large sums of money to both political parties, and with the implications that august senators financially interested in the project used their official positions to further the scheme. The outcome of the whole matter, to date, is that the federal government is to take over the intake canal as a link in the projected St. Lawrence ship canal (the ultimate purpose of the canal under the power-development scheme), and the power plant is to be taken over from the power company and completed, probably by some new company made up of representatives of the large financial backers of the project and the Quebec government. The present power company's charter is a Quebec charter. It is possible that the Quebec government may take over the plant, but as the question of whether the federal or provincial governments own the power right in navigable streams in Canada is still unsettled, that seems unlikely. Whichever way the issue is decided, the case will react lastingly against the interests of private power development. The part played by the itching palms of politicians and party collectors is not likely to be forgotten.

Unscathed

OUT OF all the dark implications that have arisen from the Beauharnois power scandal one bright light shines. No word of reproach has been cast upon the engineering or the execution of the project. All the criticism has been directed at the promoters. From the start the conception of the project, as well as its details of engineering and construction, have been of a high order. Conceived upon a scale that called for the use ultimately of the entire flow of the river in the greatest power plant on this continent, the project received unusually thorough study as to design and construction plans. The initial undertaking had to be kept within narrow cost limits without sacrifice of possible economies in carrying forward the greater ultimate development. The plans laid out two years ago, when the work was undertaken, have been carried forward under efficient management; and had not the perfidy of the promoters brought about the collapse of the financial structure, the initial units of the project would have been ready for service on schedule and at less cost than was originally estimated. Through all the scandal it is a satisfaction to record the fact that the engineering work comes out unscathed. It is the best evidence of the service that private planning of great enterprises can render, in breadth of conception, in excellence and rapidity of engineering development and in systematic prosecution of construction.

Must Wages Come Down?

ECONOMIC DEVELOPMENTS during the past few days give ample evidence that a crisis in the present depression is at hand. Some of the country's industrial leaders, hitherto staunch in their support of existing wage scales, show signs of a change of heart and have intimated that wages must soon be reduced to correspond with lowered commodity prices. Once such a doctrine becomes widely accepted—and there are hundreds of hard-pressed business men ready to accept it with open arms—both labor and industry will suffer a blow from which they will require many months to recover.

In this enlightened age, when it is universally recognized that the markets of industry depend upon the purchasing power of the masses rather than of the wealthy few, not even the most ardent capitalist would advocate lowering the standard of living of the average worker. To do so would amount to economic suicide. The proposal to reduce wages, therefore, is based upon the premise that normal purchasing power will be sustained even though money income will be reduced. Is this true?

That the cost of certain commodities used by the average family has decreased in the past two years cannot be denied, but whether this decrease is as drastic, as universal or as permanent as some of our prominent pessimists seem to believe is another matter. Wheat is cheap, but a loaf of bread shows little response to it in most places. Farmers are losing money, but prices for butter and eggs remain close to customary levels. Rents are declining, but that sterling pillar of Americanism, the man who owns his own home, fails to note any decrease in his taxes or in the interest on his mortgage. Many manufactured goods, to be sure, are selling at distress prices, and the man with cash in his pocket can find many notable bargains. But how long can this be expected to continue?

And who is this mythical person with ready cash at hand? Surely not the wage earner. For even though his hourly pay may remain at pre-depression level (and this is not universally true, by any means), the prevalence of the five-, four- and even the two-day week has reduced his actual income drastically. Despite this fact, however, there has been surprisingly little grumbling, because the average worker realizes that business is at a low ebb and that, consequently, the reduced amount of work to be done must necessarily be spread thin to maintain the millions dependent upon industry for a living. It is doubtful, however, if he will accept the more permanent

lowering in income involved in a reduced wage scale with equal resignation.

Are the present low prices permanent? Here is the crux of the situation. If they are, a corresponding reduction in the wages of labor can logically be justified when, and not before, industry is prepared to offer normal full-time employment. But if, as seems more probable, goods and commodities are only temporarily cheapened by hysterical attempts to maintain customary sales volume, lower wage rates are certain to reduce seriously the already sadly impaired purchasing power of industry's mass market—a step that industry itself will be the first to admit is a poor way to restore business conditions to normal levels.

Progress in Public Construction

REPEATED COMPLAINTS are heard of an inexcusable lack of speed in getting public construction under way. That aggravating delays occur is beyond question. Who is responsible for them and how to avoid them is less easy to answer.

Primarily the delays are due to our involved administration of public works. Too many people have an interest in every undertaking for any of them to get under way quickly. But part of the fault lies at the door of the very people who complain most about it, those who profit by the employment that public works will provide. The construction industry is not free from blame for the limitations thrown about federal work, which slow it up. The federal and state wage laws are examples. A relatively small number of contractors, by their unprincipled methods of dealing with labor, have furnished the ammunition used in forcing these laws upon construction. A notable example of how work is slowed up is found in the dispute over the contract for the St. Elizabeth hospital annex near Washington.

The W. P. Rose Co., of North Carolina, was the low bidder for the work. Protests were made to the Interior Department against awarding the contract to the Rose Co., because it had been in difficulties with labor organizations over wage cuts on previous building work. Presumably as the result of these protests the department sought to award the contract to the Adams Construction Co., on the ground that its effective bid was lower than that of the Rose Co., in that the Adams company had stated that it would do the work in 65 days less time. The opinion of the Controller General was asked, and on June 26 he replied that this consideration did not warrant the award to other than the low bidder. From then until Aug. 1 the matter was held in abeyance while representatives of labor organizations and of the Department of Labor discussed it with officials of the Interior Department. Apparently no alternative to awarding the contract to the low bidder was found; and on Aug. 1, three months after the bids were opened, the award was made to the Rose Co.

Needless restrictions, the demands of special interests and buck-passing within the administration all tend to hold back the award of public works contracts. Some of these delays cannot be avoided, but many can. If the committee now studying advance planning of federal construction does nothing more than to determine how to remove some of the needless checks to the orderly progress of public construction, its creation will have been well undertaken. Perhaps it should make this task the first demonstration of its usefulness.

A Forward Step in Registration

DEFINITE educational requirements for engineers have been proposed for inclusion in the model registration law by a joint committee set up to study needed changes in the law. The present model law sets up no such requirements. Adoption of the changes will mark a long step in advancing the status of engineers.

The lack of definite educational qualifications in the model registration law has been the subject of much adverse comment, yet it is easy to understand how such a condition came about. Some of our state laws have the same defect and for the same reason: The profession contains a large number of distinguished men who gained their training in the school of experience; to have set up educational requirements, it was feared, would have kept such men from being registered as engineers. Further, to set up a law that would keep similar men out of the profession in the future did not seem desirable.

Conditions are changing, however. More exacting demands are being made of engineers, and more fundamental technical training becomes necessary each year. The profession cannot refuse indefinitely to set up basic educational requirements and still expect to maintain a professional status. Without them engineering ultimately will be classed as a vocation. In New York State, where until this year no education requirements were contained in the license law, officials of the department of education recently proposed to transfer engineers from the professional to the vocational bureau if engineers did not raise their requirements to a par with other professions. That proposal is indicative of a progressive development in the professions, and it cannot be ignored.

Engineers like to think of engineering as a learned profession and to hold that all engineers should be accorded the same privileges under the law. These two tenets cannot consistently be held by those who hold that no fundamental technical training should be required of engineers. The broader the field held open to all engineers the broader should be the basic training required of them.

Granting, then, that some fundamental education is necessary, the question arises as to how much and of what character. Obviously raising the requirements too high is worse than having none at all, because subterfuge will be used to get by them. For the present at least the requirements should approach as nearly as possible the minimum needed by the average engineer in practice today. This the committee has attempted to provide.

For the applicant who has had an opportunity to attend college the proposed model law requires graduation from an approved school of engineering; for the man without technical training it requires that he shall "successfully pass a written, or written and oral, examination designed to show knowledge and skill approximating that attained through graduation from an approved four-year engineering course." This sets no insurmountable bar to the self-educated engineer. He may know little of integral calculus or of analytical chemistry; but if he knows how to apply them to his engineering problems, he will have met the law's requirements. Obviously, the just application of any such law rests primarily upon the administrative board. A weak law can be made almost as effective as a strong one under the broad powers given to most licensing boards, but the profession must show its good faith both to the general public and to the aspirant for admission to the profession by setting up definite educational requirements.

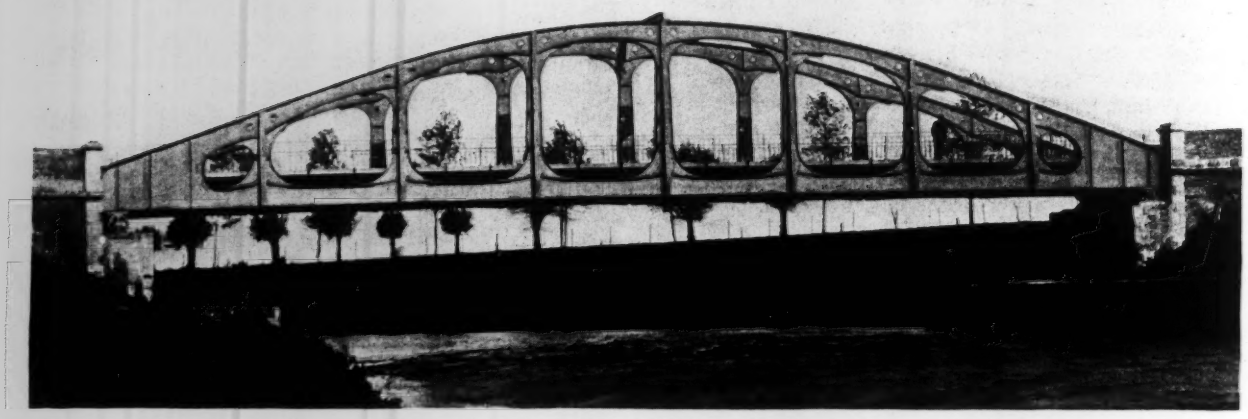


Fig. 1—Use of a curved top chord in this steel Vierendeel truss produces a span of pleasing appearance

The Vierendeel Truss

A Review of Its Development and Possibilities

By DANA YOUNG
United Engineers & Constructors, Philadelphia, Pa.

THERE have been built in Europe, chiefly in Belgium, during the past 35 years, a number of bridges whose distinguishing feature is that the supporting trusses are rigid frames, composed of a series of rectangles or trapezoids, with no diagonal members. This type of bridge was devised by Prof. A. Vierendeel, of the University of Louvain in Belgium.

Little has been written in English concerning this novel form, and it is apparently little known among American engineers. In a short item in the *Engineering News* (Dec. 15, 1898) the first Vierendeel truss built was severely criticised for being statically indeterminate, and ridiculed as a "hole in a plate girder." Since that time many more of these bridges have been built, and engineers are learning that indeterminate structures possess certain advantages. In an article in a recent issue of *Engineering News-Record* (Nov. 27, 1930, p. 836) G. W. Glick described the use of a Vierendeel truss in the foundation for the Albany Telephone Building. This exceedingly ingenious application suggests that there may be other instances in which this structural form might be advantageously employed. In view of this fact, an account of what Vierendeel has accomplished with his trusses should be of interest.

While rigid frames have been used for many years, credit must be given to Vierendeel for applying the system to bridge trusses and building many successful ones. His first bridge of this type was built at Tervueren, near Brussels, in 1896–97. It was used solely for experimental purposes, being tested to failure. The results confirmed his theoretical calculations, and he proceeded to design other bridges for actual use. Up to the present Vierendeel has built 42 of these bridges, varying from 82 to 236 ft. in span, some of steel and some of reinforced concrete. The earlier ones were built with parallel chords, but later ones were designed with curved upper chords. These latter present a very attractive appearance (Fig. 1).

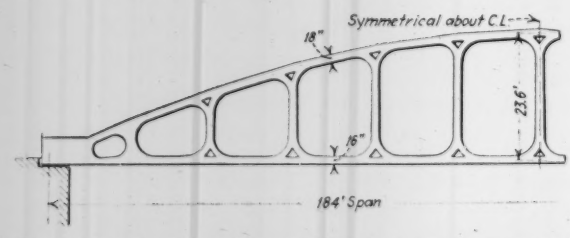


Fig. 2—Louviere footbridge, a Vierendeel truss in concrete

It was in an endeavor to correct certain faults of riveted trusses that Vierendeel devised his system. In riveted trusses the secondary stresses due to the rigidity of the connections may run very high, yet they are seldom considered in design, it being customary to calculate the stresses on the assumption that the ends of the members are hinged. In reality this is far from the truth. The ends are subject to moment and there is a point of contra-flexure near the center of the member. With absolutely rigid end connections the diagonals are unnecessary. So Vierendeel conceived the idea of simplifying the truss plan by eliminating all diagonal members and then strengthening the joints to take the necessary moment.

Vierendeel claims many advantages for this type of truss, chief of which are: (1) The true stresses may be calculated more exactly than in a triangular truss, using the customary assumptions. (2) For the same span and loads this type requires less material and is more economical than the standard truss. (3) It is more rigid and so is better able to withstand impact and vibration. (4) Since there are no diagonals, the view through the bridge is unobstructed. (5) Bridges of this type are very artistic in appearance.

It is doubtful if many engineers will agree with all

of the above-listed advantages, particularly the first three. In regard to economy, it is interesting to note that Vierendeel has made numerous comparative designs and found that his type not only weighed less but could be built at a lower cost than any other type. While this does not mean that the same results could be obtained in American practice, it nevertheless indicates that such a truss is not as fantastic as appears at first sight.

Regardless of the validity of all of Vierendeel's claims, the fact remains that many of these bridges have been built and are successfully performing the work for which they were designed. The use of this system in the foundation of the Albany Telephone Building shows that there is a place for it in American practice. The open

Belgian Congo in 1926. It is the longest of the Vierendeel bridges, having a span of 236 ft. The height at the center of the span is 32.2 ft. and the width, center to center of trusses, is 15.4 ft. The bridge was designed to carry a single-track railroad using the following live loads: locomotive 185,000 lb.; tender 124,000 lb.; cars 110,000 lb. These loads considered uniformly distributed give an approximate value of 5,000 lb. per linear foot of bridge.

The chord members are of girder section, composed of one web plate 34x$\frac{3}{8}$ in., four angles 4x4x$\frac{1}{2}$ in., and four cover plates 15$\frac{3}{4}$x$\frac{1}{2}$ in. This section is the same for both chords from one end of the truss to the other. The vertical members have a minimum section composed of

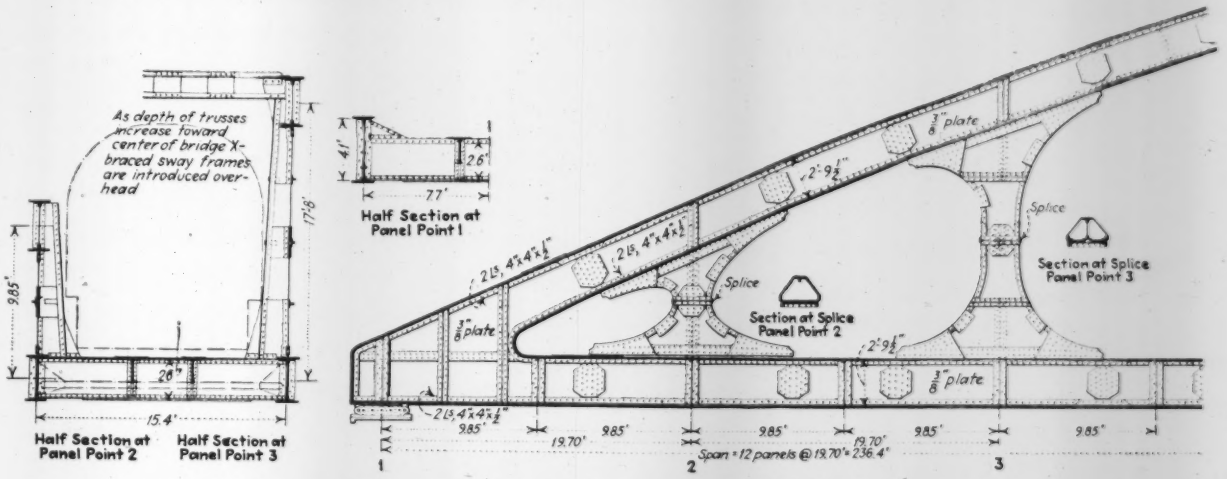

As depth of trusses increase toward center of bridge X-braced sway frames are introduced overhead
Half Section at Panel Point 1
Half Section at Panel Point 2
Half Section at Panel Point 3
Section at Splice Panel Point 2
Section at Splice Panel Point 3
Splice
Span = 12 panels @ 19.70' = 236.4'

Fig. 3—Longest Vierendeel design is the 236-ft. span Bushimaie bridge in Belgian Congo

Details show 2½ panels at one end of the twelve-panel span.

panels suggest other uses, such as for trusses in buildings where it is necessary to have window and door openings in the truss web, and for bridges over railroads and highways where visibility is important.

The accompanying illustrations show several Vierendeel truss bridges that have been built. The Grammene bridge, over the Lys River in Belgium (Fig. 4), was built in 1923. It has a span of 184 ft., a height of 18.4 ft. center to center of chords, and a width of 17 ft. between center lines of trusses. It was designed for a locomotive loading about equal to Cooper's E-45. After the bridge was completed, the deflection measured under full live load was 1.62 in., less than one one-thousandth of the span. With the train moving at 30 m.p.h. the deflection was 1.63 in. It is on the result of such tests that Vierendeel bases his claim for great rigidity and ability to withstand vibration.

The Louviere footbridge (Fig. 2) was built in 1913 to carry pedestrian traffic across the railroad tracks at the Louviere station. It is a reinforced-concrete bridge of the bowstring type, has a span of 184 ft., a height at the center of 23.6 ft., a panel length of 15.3 ft. and a width of 10.2 ft. The bridge was designed for a live load of 82 lb. per sq.ft. and a wind pressure of 30.7 lb. per sq.ft. The allowable stresses were 17,100 lb. per sq.in. for the steel and 710 lb. per sq.in. for the concrete. The lower chord is 16 in. deep and 12 in. thick. The web members have this same cross-section. The upper chord is 18 in. deep and 12 in. wide. The bracket connections are unusual in that an opening was left in the center of each for architectural purposes.

The Bushimaie bridge (Fig. 3) was built in the

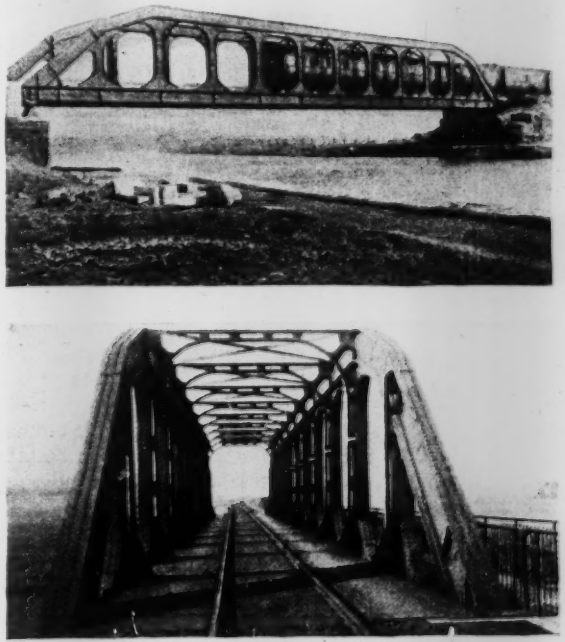


Fig. 4—Vierendeel trusses have proved suitable for railway loads

On the Grammene bridge in Belgium, shown above, a deflection of only 1.63 in. was recorded at the center of the 184-ft. span under full live load (approx. Cooper's E-45) at 30 m.p.h.

one web plate 30x⅜ in. and four angles 4x4x⅜ in. This is enlarged to form bracket connections at the end. The total weight of the steel that is used in this bridge is 248 tons.

Besides using this system of construction for simple trusses, Vierendeel has applied it to the design of spandrel-braced arches and suspension bridges. A proposed bridge of the latter type is shown in Fig. 5. In this design the customary cable suspenders are replaced by stiff verticals rigidly connected to a continuous bottom girder. For purposes of comparison, a bridge of this type was designed by Vierendeel for the same loads and with the same unit stresses as used in the design of the Williamsburg Bridge at New York, but with a span 80 ft. longer (1,680 ft.). He found that the weight per linear foot of the suspended portion of this bridge was practically the same as that of the Williamsburg Bridge. A somewhat similar design was submitted for the Florianapolis bridge in Brazil, but was not accepted. No suspension bridge of this type has actually been built.

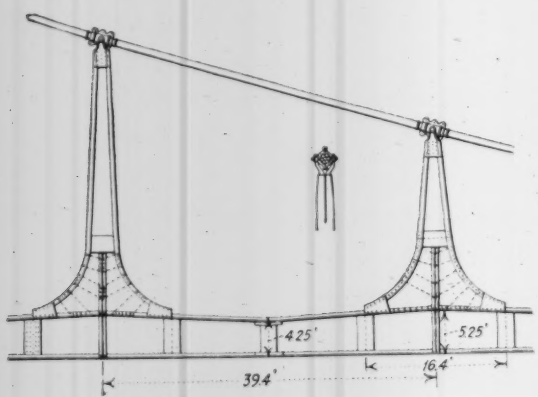


Fig. 5—Vierendeel rigid-joint principle applied to suspension bridge design

The design shown was made for a 475-ft. span bridge, but has yet to be tried.

The calculation of stresses in a Vierendeel truss by any theoretically exact method is very laborious. In the general case, for a truss with n panels there are $3(n+1)$ unknowns and the same number of simultaneous equations to solve. Vierendeel has developed an approximate method of solution that is very easy to use. It is based upon a number of assumptions, which, however, do not seriously affect a practicable design. In several cases worked out by the writer, the probable error was found to be 10 to 15 per cent. This type of structure may also be analyzed mechanically with deformeter gages. [As it was for the Albany Telephone Building. —EDITOR.]

In his book, "Cours de Stabilité des Constructions," Tome IV (Louvian 1927), Vierendeel presents his method of calculating stresses together with several complete designs.

Municipal Paving Costs Presented on Unit-Production Basis

Day-labor operations in Flint, Mich., show steady improvement in economy

UNIT PRODUCTION in the various street-paving operations of the department of public works at Flint, Mich., carried on during the 1930 construction season, has, in general, been higher than in past years. All the paving work in Flint is done directly by the city as is most all the municipal construction work.

During 1930 new pavements were laid on 39 streets, agggregating 129,771 sq.yd., or 8.95 miles, consisting of a 3-in. asphalt surface on a 7- or 9-in. concrete base. The average cost of the pavement laid was $3.44 per square yard, or, when converted to an equivalent area of 7-in. base pavement, $3.29 per square yard. The cost includes engineering, depreciation on construction tools and material yard and overhead. The actual cost during the year was 10.9 per cent lower than the amount estimated. During the 1929 construction season 360,000 sq.yd. of pavement was laid, totaling 24½ miles, divided among 90 different jobs. Pavement laid in 1928 totaled 325,000 sq.yd., or 21½ miles, on 79 separate jobs.

According to the annual report of the department, submitted by H. C. McClure, director of public works, the unit production in the various paving operations during 1930 was as shown in the accompanying table. The "clean-up" item comprises the work done in improving the street from property line to property line, including grading of parkways between sidewalks and curb, rebuilding of driveways and relocation of considerable stretches of sidewalk where it does not conform to the improved grade. The entire street width is dressed up and left so that property owners can seed or sod with little additional work.

	1928	1929	1930
Excavation			
Men per crew	5.5	6.4	7.48
Trucks per crew	4.3	4.3	4.32
Labor rate per hour	0.648	0.600	0.623
Shovel rate per hour	3.00	3.00	3.00
Truck rate per hour	2.25	2.25	2.25
Cu.yd. per shovel-hour	41.0	45.7	46.35
Cu.yd. per truck-hour	8.7	10.01	10.71
Cu.yd. per man-hour	4.5	4.84	4.49
Curb and Cutter			
Men per crew	23	21.8	23.13
Labor rate per hour	0.587	0.581	0.58
Equipment rate per hour	1.25	1.25	1.25
Linear-ft. per man-hour	2.37	3.01	2.91
Linear-ft. per equipment-hour	54.5	64.2	81.72
Fine Grading			
Men per crew	20	20	15.4
Labor rate per hour	0.619	0.542	0.539
Equipment rate per hour	1.50	1.50	1.50
Sq.yd. per man-hour	8.50	9.61	9.97
Sq.yd. per equipment-hour	190.0	172.6	152.2
Foundation 7- to 9-in.			
Men per crew	17	18.75	17.2
Labor rate per hour	0.583	0.639	0.598
Equipment rate per hour	3.00	3.00	3.00
Sq.yd. per mixer-hour	162.0	168.3	191.3
Sq.yd. per man-hour	6.0	6.9	7.43
Asphalt Placing			
Men per crew	.....	22.1	15
Sq.yd. top per man-hour	.....	11.10	12.44
Sq.yd. binder per man-hour	.....	10.77	11.69
Asphalt Plant			
Men per crew	.....	11.0	11.0
Sq.yd. top per man-hour	.....	21.13	18.34
Sq.yd. binder per man-hour	.....	20.50	17.24
Clean-Up			
Labor rate per hour	.....	0.52	0.52
Equipment rate per hour	.....	2.50	3.50
Team rate per hour	.....	0.90	0.90
Sq.yd. per man-hour	.....	.....	8.72
Material Prices			
Asphalt, ton	20.24	18.24	16.99
Asphalt sand, ton	1.38	1.39	1.20
Asphalt filler, ton	5.30	5.30	5.20
Binder stone, ton	2.02	2.19	2.00
Fuel oil, gal	0.0535	0.0442	0.0425
Coal (delivered), ton	.....	7.00	4.30
Cement, bbl	1.83	1.99	1.99
Coarse aggregate, batch (24 cu.ft. gravel, 12 to 13 cu.ft. sand)	3.65	3.85	3.45
Fine aggregate, cu.yd	1.90	1.90	1.77
Gravel (60-40), cu.yd	2.25	2.10	2.00
Curb reinforcing, linear-ft	.....	0.0166	0.0152
Foundation reinforcing, sq.ft	.....	1.80	1.74

Sludge-Disposal Methods in Two Similar Sewage Plants

By E. G. McCONNELL
City Sanitary Engineer, Charlotte, N. C.

Filtration of sludge is practiced in one activated-sludge plant at Charlotte, N. C., and digestion and drying in other

WHETHER to dewater activated sewage-sludge by digestion followed by drying beds or by some type of mechanical filtration is a question much discussed among engineers. Generally speaking, digestion and drying serve well for all plants if ground area is available. For large plants it may be advantageous financially to go into the fertilizer business, in which case a filtered product is desirable. The comparison given in this article obtained at two plants, which are nearly alike, is perhaps the first study of the kind ever attempted. The generally held view that digestors produce a more innocuous type of sludge than do filters, especially for smaller plants, seems to be more firmly established than ever before by the painstaking observations and analysis presented by Mr. McConnell. —EDITOR.

AN UNUSUALLY good opportunity to compare two common methods of sludge disposal is afforded in two three-year-old activated-sludge plants of much the same design at Charlotte, N. C., where filtration of the sludge is practiced at one plant and digestion at the other. Operating costs and sanitary quality come out essentially even. Handling a highly putrescible filter cake is more troublesome than the disposal of a digested product, but this might not be so were the plant big enough to make a marketable fertilizer.

The purpose of this paper is to compare 1930 operating results and costs of these plants, which handle practically the same amounts of sewage, are located within 3 miles of each other and are operated under the same supervision. A well-equipped laboratory is maintained with a chemist in charge who gives his full time to analytical work. The two operating crews are well up to standard. Similar procedure governs the operation of each plant.

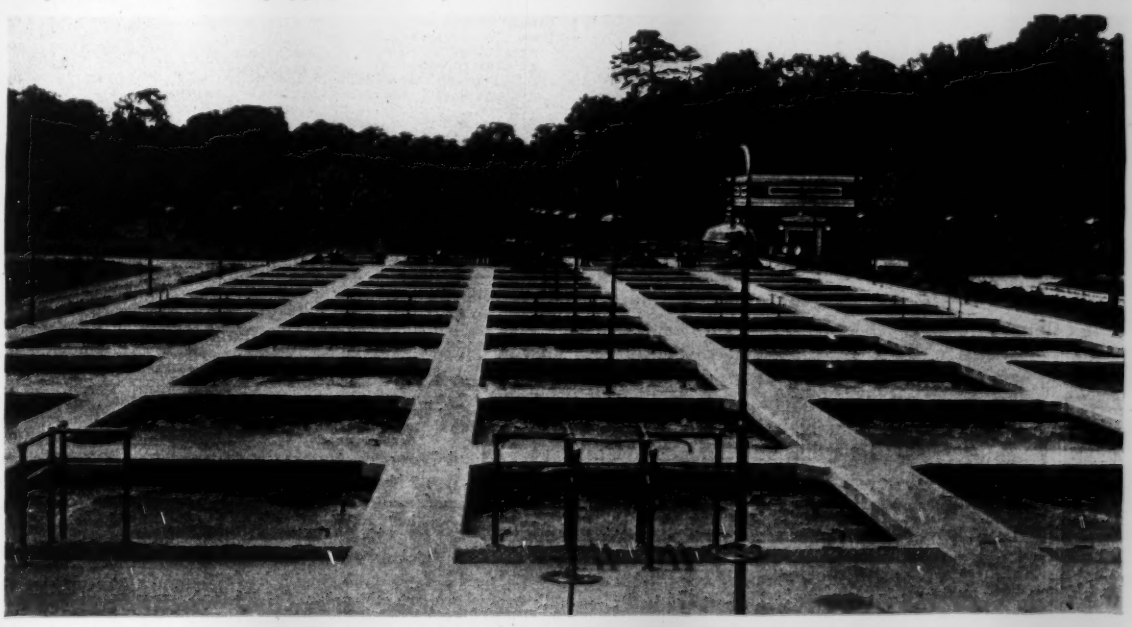
Design Comparisons—The Irwin Creek plant is provided with a manually cleaned coarse screen, a mechanically cleaned grit chamber, six 1-m.g.d. ridge-and-furrow bottom-aerating tanks, six mechanically cleaned final settling tanks and vacuum filters for the excess activated sludge. Only four of the six aerating and settling units are in operation.

The Sugar Creek plant has a mechanically cleaned instead of a manually cleaned coarse screen, a grit chamber like that at the other plant, a mechanically cleaned presettling tank (not provided at Irwin Creek), five mechanically cleaned final settling tanks, covered sludge-digesting tanks with a holding capacity of 4.5 cu.ft. per capita and open sludge-drying beds with an area of 1 sq.ft. per capita.

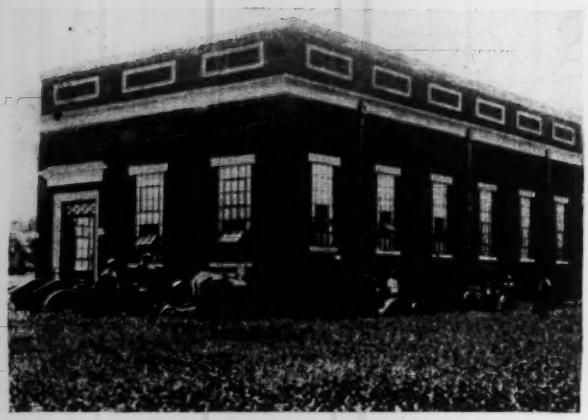
Except for the presettling tanks, all the grit- and sludge-removing apparatus is of the scraper-bucket type, moved longitudinally along the tank bottoms and then upward. For the presettling tanks, revolving scrapers or sweepers that push the sludge to a central discharge pipe are used.

Ferric chloride is added to the sludge before filtration at the Irwin Creek plant, while at the Sugar Creek plant lime is added to the sludge before it goes to the digesters.

The Irwin Creek plant is provided with single-stage

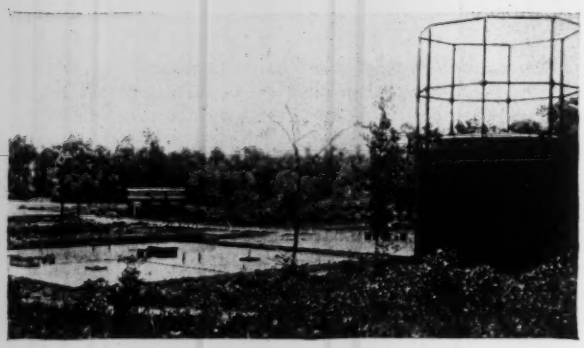


Aeration tanks at Sugar Creek activated-sludge plant
Diffused air agitation is shown on surface of sewage. Building at the right is laboratory.



Filter house at the Irwin Creek sewage works

Nearby farmers awaiting their turn to load filter cake. The truck at the right is under a conveyor. Oats in foreground grown on filter-cake fertilized land.



Sludge-digestion tanks and gasholder at Sugar Creek plant

Gas domes and meters on top of tanks. Laboratory is in background.

air compressors, while the Sugar Creek plant has three-stage compressing units. Also at the Sugar Creek plant two gas engines are available for utilization of sludge gas, with provision for heating the digesters with exhaust jacket water. One 225-hp. engine is directly connected to an air compressor, the other 75-hp. unit drives a sewage pump. Due to mechanical difficulties this method of gas utilization has not proved very satisfactory. Gas is used for power production, and the cooling jacket water together with the water from a heater placed on the exhaust is used for maintaining temperatures in the digesters. The cost of maintaining the engines practically wipes out the value of the power produced.

The Irwin Creek plant serves an estimated connected population of 25,000. The average sewage flow during 1930 was 2.75 million gallons a day (m.g.d.). Of this flow it is estimated that 7 per cent is trade waste, chiefly of laundry and hosiery-mill origin. The Sugar Creek plant has an estimated connected population of 50,000, an average flow during 1930 of 3.9 m.g.d. and handles an estimated 15 per cent industrial waste load, principally from laundries, textile mills and one cotton-oil refinery.

At each plant the sludge is returned by slow-speed centrifugal pumps. Although air lifts are provided for this purpose, it has been found that the excessive cost of air-lifting is not compensated for by any material advantages or extra quality of air-lifted sludge.

Considerable difficulty has been encountered at both plants with "bulking sludge." This condition apparently bears no relation to the method of returning sludge, as extensive experiments have been conducted with both air-lifting and pumping methods without decisive results. No definite ideas have been formed as to the real causes of bulking other than that it is believed to be proportional to effective air control.

Air Environment—The Charlotte plants are operated upon the assumption that air provides the environment for production of activated sludge, and therefore it is the concentration and quality of sludge within the aeration units that govern the oxidation of organic matter contained in raw sewage. At each plant the biological oxygen demand (b.o.d.) of the raw sewage averages 200 p.p.m., and it has been found that approximately 0.2 per cent of dry solids in the aerating tanks will properly perform the required work under normal conditions. If less than 0.15 per cent of dry solids are present, the effluent tends to suffer in quality; while a concentration in excess of about 0.3 per cent requires an increased power demand and slightly interferes with settling efficiency in the final tanks. The quantity of sludge carried in the aerators may well be dependent upon the amount of air being applied for agitation in excess of that actually required for organism environment. If quantities of excess air are available (which is not the case at Charlotte, where less than 1 cu.ft. per gallon is used), it might prove the better plan to obtain as much benefit as possible from this extra air by carrying a higher concentration of solids.

The following operating data are given, in so far as possible, upon a unit of per m.g. of sewage treated. The Irwin Creek plant treated 993 m.g., while the Sugar Creek plant handled 1,427 m.g.—a difference that reflects unfavorable costs for the smaller plant. It should also be noted that the aerating units at the Sugar Creek plant handle presettled sewage but are subjected to the supernatant load from the digesters.

In Table I the higher percentage of solids carried in

TABLE I—GENERAL OPERATING DATA OF TWO SEWAGE-WORKS AT CHARLOTTE, N. C., FOR 1930

	Irwin Creek Plant, Sludge Filtration	Sugar Creek Plant, Sludge Digestion
Sewage treated, m.g.	993	1,427
Power, kw.-hr. per m.g. sewage		
Total plant operation	1,000	845
Total air compression	835	655
Air compressed for aeration	695	655
Air compressed for conditioning sludge and for filters	140	....
Motors and lighting	165	190
Air, cu.ft. per gal. sewage	1.0	0.9
Returned sludge, gal. per m.g. sewage	495,000	515,000
Dry solids in returned sludge, per cent	0.68	0.66
Dry solids in aeration tanks, per cent	0.24	0.19
Settleable solids in aeration tanks, per cent in 30 min.	38	24
Wet coarse screenings, lb. per m.g. sewage	....	35

TABLE II—COMPARISON OF SLUDGE-DISPOSAL DATA

Irwin Creek Plant Sludge Filtration		Sugar Creek Plant Sludge Digestion	
Waste sludge filtered per m.g. sewage, gal.	9,250	Fresh solids to digesters per m.g. sewage, gal.	2,550
Dry solids in waste sludge, per cent	1.7	Dry solids in fresh solids, per cent	5.5
Ferric chloride per 1,000 gal. sludge, gal.	8.2	Dry solids as fresh solids to digesters per m.g. sewage, lb.	1,170
Filter cake per m.g. sewage, lb.	7,400	Waste activated sludge to digesters per m.g. sewage, gal.	14,000
Filter cake per sq.ft. filter area per minute, lb.	0.17	Dry solids in excess sludge, per cent	0.66
Moisture in filter cake, per cent	82	Dry solids as excess sludge to digesters per m.g. sewage, lb.	770
Dry solids removed per m.g. sewage, lb.	1,315	Total dry solids to digesters per m.g. sewage, lb.	1,940
Dry solids removed per m.g. sewage (by calculation), lb.	1,600	Lime to digesters per m.g. sewage, lb.	99
Dry solids unaccounted for, per cent	18	Digested sludge drawn per m.g. sewage, gal.	3,000
		Dry solids in digested sludge, per cent	4.4
		Dry solids as digested sludge per m.g. sewage, lb.	1,100
		Dry solids unaccounted for, per cent	46

TABLE III—LABORATORY ANALYSES (1930 Averages)

Parts Per Million

	Irwin Creek Plant—Sludge Filtration			Sugar Creek Plant—Sludge Digestion		
	Influent	Effluent	Per Cent Reduction	Influent	Effluent	Per Cent Reduction
Temperature, deg. F.	67	.....	....	66	.....	....
Suspended solids	209	13	94	238	31	87
Dissolved oxygen	0.7	5.0	....	0.1	4.7	....
B.o.d.	198	26	87	186	19	90
Nitrites	.....	0.4	....	.....	1.7	....
Nitrates	.....	1.6	....	.....	4.7	....
Total bacteria, 37 deg. C	1,560,000	46,000	97,000	1,600,000	49,000	97,000

TABLE IV—1930 OPERATING COSTS OF TWO METHODS OF SLUDGE DISPOSAL COMPARED

	Irwin Creek Plant, 1930 (Sludge Filtration)	Sugar Creek Plant, 1930 (Sludge Digestion)	Irwin Creek Plant, (Weighted Average, 1,427 m.g.)
	(Per Million Gallons)		
Labor and superintendence	$10.15	$7.05	$7.20
Power	15.10	12.28	12.65
Repairs			
Mechanical	0.20	0.53	0.70
Electrical	0.20	0.42	0.42
Building	0.15	0.20	0.14
Gasoline	0.25	0.02	0.24
Lubricants	0.21	0.19	0.16
Sludge-conditioning chemicals	2.52	0.60	2.52
Motor transportation	0.53	0.37	0.37
Laboratory supplies	0.10	0.07	0.07
Miscellaneous supplies	0.25	0.49	0.43
Miscellaneous expenditures	0.22	0.44	0.42
Total operating cost	$29.88	$22.66	$25.32
Fixed charges			
$410,000 @ 6% (1,427 m.g.)	.....	17.25	.....
$360,000 @ 6% (993 m.g.)	21.75	.....	.....
$360,000 @ 6% (1,427 m.g.)	.....	.....	15.12
Total costs	$51.63	$39.91	$40.44

TABLE V—OPERATING COST SPREAD AND PER CAPITA COSTS

	Irwin Creek Plant* Sludge Filtration		Sugar Creek Plant† Sludge Digestion	
	Per Cent Operating Cost	Cost Per Capita	Per Cent Operating Cost	Cost Per Capita
Labor and superintendence	31.1	$0.37	29.8	$0.19
Power	49.2	0.57	53.6	0.35
Sludge disposal	14.0	0.16	4.9	0.03
Repairs	1.6	0.02	5.1	0.03
Supplies	2.7	0.03	4.3	0.03
Miscellaneous	1.4	0.02	2.3	0.01
Totals	100.0	$1.18	100.0	$0.64

*993 m.g. sewage flow, 25,000 persons connected.
†1,427 m.g. sewage flow, 50,000 persons connected.

the aerating units at the Irwin Creek plant is the result of a lack of uniformity in operation because of uncertainties of filter-cake handling and consequent storage of solids in the aerating units.

Comparisons—Perhaps the most marked comparisons in Table II are the uaccounted-for solids at each plant. By unaccounted-for solids is meant the difference between the net solids removed by calculation and the solids actually accounted for in the final sludge products. At the Irwin Creek plant there is a shrinkage of 18 per cent of the solids during the process of aeration. At the Sugar Creek plant 46 per cent of the solids disappeared during the aeration and digestion processes.

So far as sanitary quality of effluents is concerned, Table III shows little choice. The most noteworthy comparison is the greater amount of nitrification effected at the Sugar Creek plant, which aerates presettled sewage. The more effective removal of suspended matter at the Irwin Creek plant is undoubtedly due to the lower velocity of flow through the final settling tanks.

The comparative cost figures provide a most interesting study. In an effort to obtain an equitable comparison between the two sludge-disposal processes, weighted averages have been carefully determined for a theoretical treatment of 1,427 m.g. per year at the Irwin Creek plant. All cost figures are prepared from the actual budgets allotted for the complete operating expenses of the plants. These figures include everything expended in 1930. It is quite evident that the slight saving of $2.66 per m.g., based upon equal flows, in operating cost alone in favor of the digestion process is practically wiped out by additional fixed charges for this type, leaving a net saving of only $0.53 per m.g. for the digestion process. This would seem to indicate, therefore, that the chief items to consider in the choice between the two sludge-disposal methods would be plant-construction costs and facilities for disposition of the sludge product. Undoubtedly for small plants such as the Charlotte installations the digested sludge would be easier to handle, as it is inoffensive and is subject to being stored. For larger plants it would appear that, where it is practicable to process the filter cake into a marketable fertilizer, as is done at Milwaukee, the filtration process might be the better proposition.

Final Sludge Disposal—The chief operating difficulty at the Irwin Creek plant is the proper disposition of the filter cake, which putrefies within a few hours and becomes very offensive. The present method is to spread the cake upon tillable land and plow it under, or bury it in furrows and cover. This procedure is an unsatisfactory solution to a vexing problem, and the whole scheme is dependent upon weather conditions. Experiences at Charlotte indicate that approximately 25 acres of cleared land per m.g. of sewage treated per day is required for filter-cake disposal.

At the Sugar Creek plant the digested sludge is removed from the drying beds without expense to the city by a private concern, which processes it into a marketable fertilizer by further drying and the addition of ammonia and potash compounds. The city is paid for the sludge on a sliding scale of 50c. to $2 per ton 10 per cent moisture basis, according to the volume removed per month. The 1930 cost figures given in the table do not include any credit for sale of sludge at the Sugar Creek plant, as the contract with the fertilizer company did not take effect until Jan. 1, 1931.

The operating-cost spreads and per-capita costs given in Table V readily indicate that power should be the chief item of attack in cost reduction of the activated-sludge process. The power percentage is 4.4 per cent higher at the Sugar Creek plant, yet it treats presettled sewage. A number of factors enter into this apparently paradoxical situation, the chief items being the greater efficiency of air-compressing units at the Irwin Creek plant and the heavier trade-waste and supernatant load at the Sugar Creek plant.

World's Developed Waterpower Doubles in Ten Years

According to estimates made by the U. S. Geological Survey, the capacity of the waterwheels in the constructed plants of the world was 23,000,000 hp. in 1920, 29,000,000 hp. at the end of 1923, 33,000,000 hp. at the end of 1926 and 46,000,000 hp. at the end of 1930, an increase of 100 per cent in ten years. The increase in Europe during the last four years has slightly exceeded that in North America. Outside of the United States the greatest increases in constructed plants have been in Italy, Japan, Canada, Germany, Switzerland, Austria and Sweden. The estimates of capacities for many of the countries are based on data collected a year or more ago, but the estimates for the United States and Canada are corrected to Jan. 1, 1931. The estimates of potential waterpower are based on ordinary low water and an efficiency of 70 per cent in the plants.

Preshrunk Concrete Makes Smooth Pavement Patches

Retamping after initial set to eliminate shrinkage and attention to details of backfill and sides of cut will insure smoothness

By L. P. CORCORAN
Field Engineer, Portland Cement Association, Chicago, Ill.

PAVEMENTS can be patched so that their original utility and appearance are restored. Fig. 1 shows a patch in Oakton St., Evanston, Ill., which was made in the fall of 1927. After four years of service no settlement has occurred, and there is no evidence of any separation between the patch and the slab. The patched area appears to be as good in every respect as the original slab. The contractor describes the method of making this replacement as follows:

Care was taken to see that the sides of the cut were truly vertical and that a portion of the wire mesh in the original pavement projected sufficiently to insure bond with the new reinforcement used in the replacement. The mix was 1 : 1½ : 3, which was allowed to stand 40 min. before being used, to reduce shrinkage. The concrete was placed very dry, was well tamped and was finished with a wood float and a short piece of belting. Shortly after the work was done, cold weather set in and the fresh pavement was covered with burlap, straw and manure and kept covered for nearly 30 days.

Two years ago a patch was made in the concrete pavement on Dearborn St., near Grand Ave., Chicago. Today it blends so perfectly with the surrounding slab that it was necessary to clean the pavement and chalkmark the outline of the patch in order to photograph the view shown in Fig. 2. Another view shows the dry consistency of the concrete used in making this patch. The concrete was thoroughly rammed into the opening and struck off ½ in. high. It was allowed to rest in this condition for 45 min., after which it was again thoroughly tamped, finished with a wood float and a short piece of belt and covered with wet sand to cure for several days.

Allowing the concrete to take its initial hardening and then retamping it before final finishing are the significant features of these patching operations. Concrete shrinks slightly during its initial hardening, and the delayed tamping and finishing provides a preshrunk concrete to fill the opening. Research by the Portland Cement Association indicates that concrete can be manipulated two or three hours after mixing without injury, providing no aggregate or water is added.

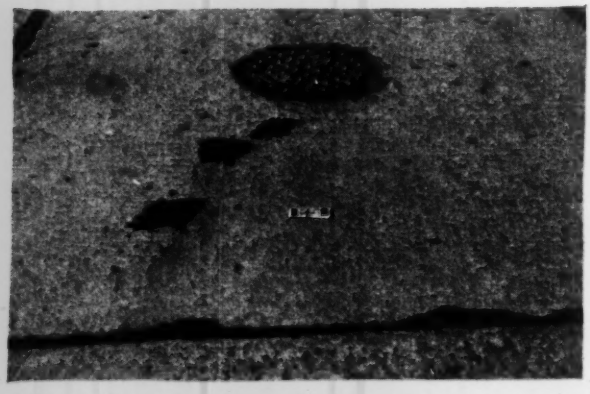


Fig. 1—Four-year-old patch of dry concrete, Oakton St., Evanston, Ill.

Patch, nearly invisible, is immediately in front of manhole with three tar splatches on the left periphery.

Fig. 2—Five-year-old patch on Dearborn St., Chicago

Dry concrete and retamping after initial set made a perfect patch on heavily traveled street.

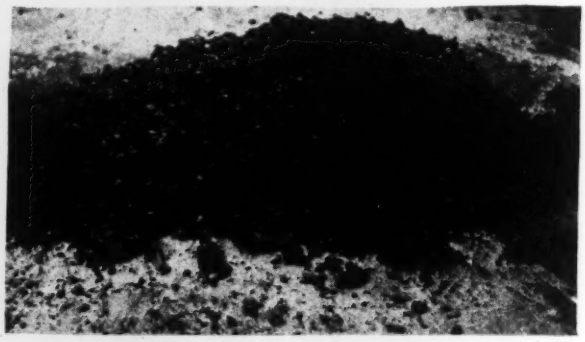


Fig. 3—Consistency of concrete used in Dearborn St. patch

Experience indicates that the following factors aid in making good concrete patches:

1. The opening in the pavement should be made larger than the area of the excavation in the subgrade to provide solid shoulders for the replaced pavement.

2. Reinforcing steel should be cut at the center of the opening and bent back to its original position, where it will serve as a tie between the patch and the adjacent slab.

3. The face of the exposed concrete should be left naturally rough and cut with square corners to avoid "feather edges" in the subsequent patch.

4. The backfill is important, and every effort should be made to eliminate future shrinkage. Whether the backfill should be made with the material removed from the excavation depends entirely on the characteristics of this material. If not easy to compact, the backfill should be sand or screenings, and in any case the fill should be thoroughly puddled or jetted two days or more prior to patching. In some instances a tamped mixture of sand and cement (1 : 15) may be used to advantage instead of puddling or jetting.

5. The subgrade should be left 2 or 3 in. low. The shoulders between the edge of the fill and the face of the slab should be squared, so as to provide an undisturbed support for the replaced area in case of settlement in the fill.

6. The exposed face of the concrete should be thor-

oughly cleaned, so as to provide a large area of clean aggregate to which the new concrete may bond.

7. Just prior to placing the concrete in the opening, the face of the adjacent slab should be brushed with a cement grout as a further aid in providing a bond between the new and the old concrete.

8. A 1 : 1½ : 2½ mixture should be used with only enough mixing water to give the concrete a damp appearance. Mixing should continue for at least 2 min.

9. The concrete should be placed in the opening in layers about 3 in. thick and thoroughly tamped. If the concrete is of the best consistency for this type of work, a thorough tamping will be required to bring moisture to its surface.

10. The opening should be filled to overflowing and struck off higher than the top of the pavement. The concrete should be allowed to remain undisturbed in this condition until it has taken its initial hardening, which may require from 35 min. in hot weather to two hours or more in cold weather.

11. After the initial hardening the concrete should be thoroughly tamped, carefully struck off with a straight-edge flush with the surrounding pavement and finished with a wood float or belt to an appearance similar to that of the adjacent pavement.

12. It is important that the patched area be kept wet and at a temperature above 50 deg. for several days. In warm weather the patches, made as described, can be opened to traffic after 48 hours. In cold weather all traffic should be kept off the patch for a week or more.

Old Wood Flume Utilized as Falsework for New Structure

Electric service company in Brazil builds a steel-truss-supported concrete flume over an 800-ft. river crossing, utilizing existing piers

By R. G. HACKETT

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AN UNUSUAL flume-construction job was completed last fall at the Dourados hydro-electric plant owned by Empreza Forca e Luz de Ribeirao Preto, a subsidiary of American & Foreign Power Co., Inc., in the state of São Paulo, Brazil. The plant is located on the Sapucahy River in the northern part of the state, about 200 miles from the city of São Paulo. It has an installed capacity of 6,400 kw., operating under a head of 95 ft., and its hydraulic works consist principally of a low diversion dam 970 ft. long and 10,800 ft. of open conduit. The conduit line, largely lined canal, crossed a bend in the river a short distance below the diversion dam in a wooden flume 800 ft. long that had become inadequate.

In the reconstruction of this flume an unusual design was employed, and an ingenious method of construction was devised whereby the existing structure was used as falsework for the new erection—the old trusses, in turn, being transported out over the new bridge. This method was adopted to meet the necessity of placing the new bridge under the old on the existing piers.

Old Flume—The old flume structure consisted of sixteen spans of 49 ft. each, resting on concrete piers, each span made up of two trusses having wooden top chords and compression web members, wire-rope bottom chords and tension diagonals of flat steel. The top chords carried wooden cross-beams from which was suspended a semi-circular wood-stave flume of 7½-ft. radius. The structure had no lateral bracing, nearly all the connections were defective, and some of the wooden members were in a state of decay. Accordingly, it was decided to rebuild the flume, retaining only the original piers, and the design described below was adopted.

New Design—The controlling feature of the design was the requirement of 1,765 cu.ft. capacity, which provides 706 cu.ft. over present needs. The width of the existing piers did not permit a flume of this capacity to rest on top without extending some distance over each side; consequently, it became necessary for economy of steel to use deck trusses on the old piers, supporting a flume with an overhang at each side.

A reinforced-concrete flume was chosen, the thickness of the concrete varying from 4 to 5½ in. The water load spans a distance of 5 ft. 7½ in. between the steel frames and the flume. The trusses are of Pratt deck type with ends resting on 1½-in. bearing plates, expansion slots being provided at alternate piers. Expansion joints in the flume concrete are provided at the same places. To provide proper bearing area, the top of each pier was rebuilt and thickened with a reinforced-concrete cap.

Sequence of Operations—The various steps that were followed in the erection, by which the old structure was made to serve as a carrier for the new steel members, can be briefly stated as follows:

1. Transverse tierods between the old trusses were cut, the wood-stave flume was removed, and the trusses were moved inward on the pier an amount sufficient to permit new steel trusses being lowered to their position alongside the old ones.

Concrete flume on steel-truss bridge in Brazil

2. A rectangular piece was cut down from the top on each side of the piers, approximately to the required elevation, forming a shoulder upon which the new steel trusses were temporarily placed.

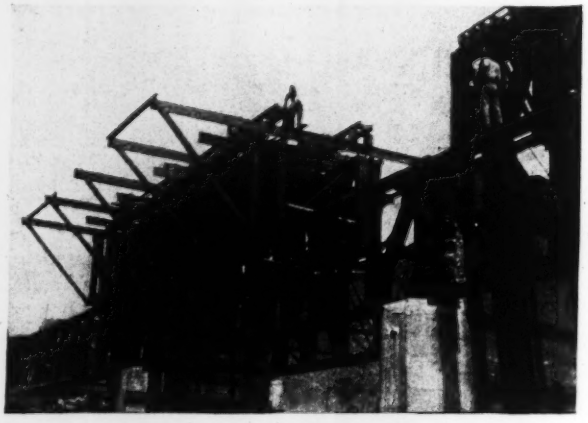
3. Rails were laid on top of the old structure along the outer edge for carrying two sets of traveling cranes. These cranes were a form of trolley consisting of double I-beams supported over each rail by two-wheel trucks and having hand-operated chain hoists suspended from each end.

4. Both trusses of a span, suspended by chain hoists from the trolleys, were rolled out over the old flume and dropped into position on the shoulder cut into the piers.

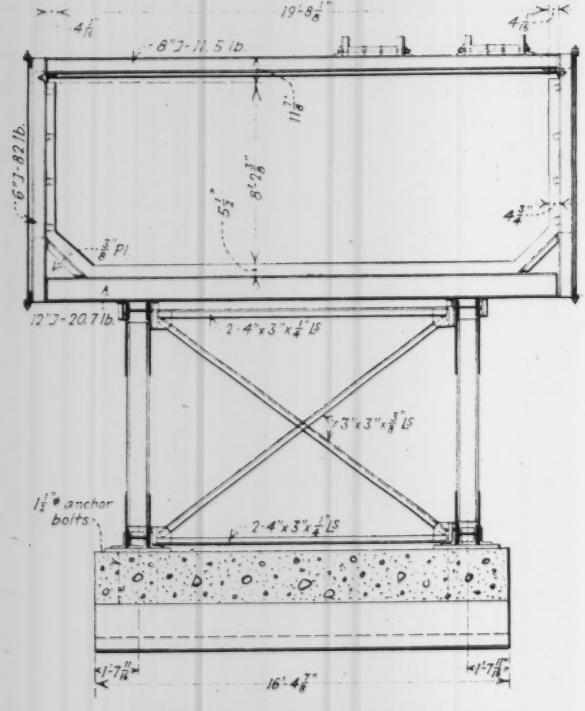
Trolley carriages running on old wood trusses transported new steel trusses to position

5. Wooden posts were placed under the ends of each truss alongside the piers for taking the weight, while the new pier caps were placed. These posts served no purpose until later during the seventh step.

6. The two trusses that formed the last span of the steel bridge were braced across the top and sides in such a manner that they could be used as a form of trolley, rolling on rails on the newly erected spans and completely inclosing the old sections of wooden trusses. By this means it was possible to pick up each span of the wooden truss and roll it off to the end of the flume, where it was demolished. The span that had been used as a trolley was finally put in position at the upstream end in the same way as the others, the wooden trusses of this one span being dropped to the river.



Two new steel trusses formed a traveler for removing the old wood trusses



Section through trusses and frame of the flume

7. The high central portion of the piers that had supported the wooden trusses was cut down, and new reinforced caps were put on all piers. Steel members were bolted in place on these caps, and the temporary wooden posts were removed. There remained at this stage only the less difficult work of rolling out and erecting the steel frames, followed by formwork and pouring of concrete. Forms were fastened to the flume bents, and a concrete of approximately 1:2:4 mix was poured. Two coatings of bituminous surface waterproofing were applied to this concrete.

All steel for this job was shipped from the United States to the port of Santos, thence 350 miles by railroad and 18 miles by motor truck to the site, where it was assembled. All riveting was done in the field.

The designing for this project was done by the engineering department of the Emprezas Electricas Brasileiras, S.A., in Rio de Janeiro. The construction was directed by the construction department of the same organization.

A. Fagnani, Brazilian construction engineer, superintended the erection.

New municipal market building in Cholon

This building was designed and constructed by the public works department. The interior is clean and well ventilated, and is as attractive as the exterior.

Public Works in Indo-China

By HAROLD E. BABBITT

Professor of Sanitary Engineering, University of Illinois

PROBABLY no other country in the world so ancient as Indo-China is being opened up under pioneer conditions with greater rapidity. The intensity and amount of work performed, the large expenditures involved, the results attained, and the breadth of the activities of the public works department are great. As there are large areas of public land yet unpopulated, the expectation that the country will rank among the world's most productive regions for the cultivation of rice seems soon to be realized.

The financial program for the construction of public works calls for an annual expenditure of about $11,000,000. (Costs are expressed in American dollars on the basis that $1 is equal to two piasters.) The present program is to be completed in 1939 with a total expenditure of $100,000,000. This will be apportioned about as follows: $37,500,000 on railroads, $25,000,000 on irrigation, $15,00,000 on highways, $3,750,000 on harbors, and $8,750,000 on other works. This program was undertaken in 1927 with the expectation of spending $135,000,000 on new works. Rapid development of public works in Indo-China began in 1900 and has continued with increasing annual expenditures, as shown in the accompanying table. The figures in the table do not include some local expenditures in Cochin China, which would increase the total by about 6 per cent, and does not include any prediction of the expenditures for maintenance, which are constantly increasing.

Organization—The public works department of Indo-China is charged with the construction and maintenance of all public works in the five states of the colonial union—namely, Annam, Tonkin, Laos, Cambodia and Cochin China. Only in the last-named state are there some small public works expenditures not included in the colonal budget. The department organization is divided into two groups, known as territorial services and special services. There are five divisions of the territorial services, corresponding to the states, each division directed by an administrative chief. There are three special services for work that does not fall naturally to the political boundaries of states. At present these services are devoted to the study of railroad development. The public works department is administered by the inspector general of public works, who is charged also with the direct administration of the special services. The inspector general is assisted by a chief engineer, who is second in command and who is especially charged with the management of the railroads, which are all government owned. The chief architect is responsible for the design and construction of public buildings throughout the country.

Each state administrative chief is responsible for all

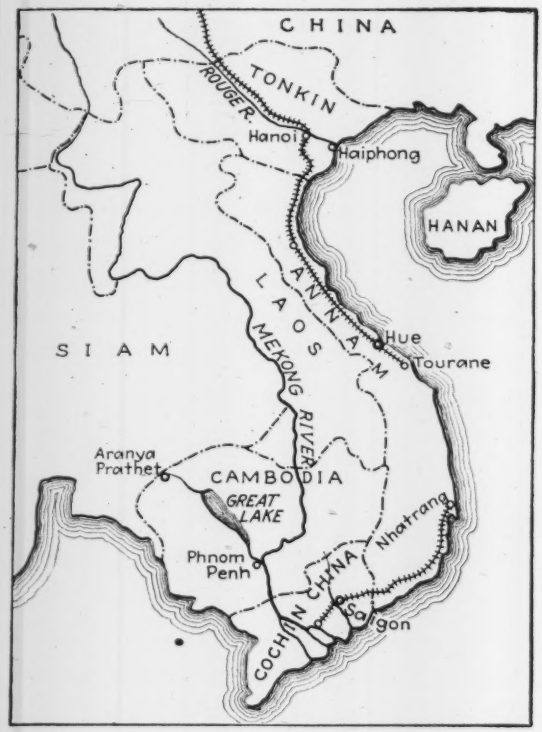
PUBLIC WORKS EXPENDITURES IN INDO-CHINA
(Gold Dollars)

Period	Wages and Personnel	Maintenance	Construction	Annual Expenditures on Construction
Pre-war, 1900–13	16,558,000	11,542,000	67,474,500	4,819,607
War, 1914–20	8,981,500	13,527,000	44,240,000	6,320,000
Post-war, 1921–25	10,176,500	16,911,000	45,742,000	9,148,000
New program, 1926–37	.....	.....	135,000,000	11,250,000

Preparing the pier foundations for the railroad bridge at Pusat in Cambodia

expenditures under his budget, which includes roads, irrigation, drainage, rubber control, public buildings, inland navigation, ports, wharves, lighthouses and buoys, public water supplies, sewerage, distribution of electrical energy, utilization of quarries and the control of highway and canal traffic. There are no local public works departments except in some of the larger cities, and these functions under the colonial department. All but the superior positions in the department and the position of keeper of the lighthouse are open to natives, and a school has been provided at Hanoi for their training.

Railroads — The period from 1900 to 1910 was the most active in railroad construction. During this time 200,000,000 francs were spent in the construction of 755 miles of line. After 1910 there was a lull in railroad construction until 1922, when work was pushed vigorously, and there are now 1,500 miles of railroad in operation, including lines in Chinese territory. Money is being spent at the rate of about $4,000,000 annually on new construction. The most important section of road to be completed and upon which work is now in progress is the section from Tourane to Nhatrang. This will give a complete north and south line across the country. The gap to be closed is 341 miles long and it is expected that it will cost slightly more than $18,000,000. Another important line upon which work is progressing will connect Phnom Penh, the capital of Cambodia, with the Royal Siamese Railroad at Aranya Prathet. This line will be 392 miles long and will cost $22,500,000. Another of the new lines is that from Mytho, near Saigon, on the left bank of the Mekong River in Cochin China, to Baclieu, near the coast in the same province. The line is 177 miles long and will cost $10,000,000. It is an expensive line because of the large river crossings forming the mouth of the Mekong. This railroad is being pushed to completion, as it will open up important territory devoted to the cultivation of rice.



Map of Indo-China

For the railroads throughout Indo-China, Siam and the Malay States, whose railroads will soon be interconnecting, standard gage is 1 meter, or 3 ft. 3⅜ in. In Indo-China the roadbed is graded to a width of 14 ft. 5⅛ in. Ballast is laid to a thickness of 20 in. and a width of 7 ft. 10 in. Steel ties are used except in forest regions. These ties weigh about 80 lb. and will be laid 2,000 to the mile. Heavy hardwood ties will be used in forest regions because of their availability. The wooden ties are 5 ft. 11 in. long, 7 in. wide and 4¾ in. thick. The rails will rest directly upon the ties and will weigh from 37 to 55 lb. per yard, the policy being to bring all rails to the heavier weight and to replace all wooden ties with steel. For curves the minimum radius is fixed at 328 ft. and the grades do not exceed 1½ per cent on important lines, with one exception, where the grade is 2½ per cent. Culverts and other small structures in the roadbed are built of masonry. Small bridges are built of steel or reinforced concrete, the latter being preferred where transportation and erection conditions are favorable.

Irrigation—Preparation of land for rice cultivation is among the important activities of the public works department, in so far as the prosperity of the country is concerned. Conditions are such that the works can be classified as: (1) protection from inundation by the sea; (2) flood protection, irrigation and drainage; (3) river and farming methods regulation; (4) irrigation of dry land. The needs of navigation, communication and irrigation are combined in the design and construction of canals.

The lands requiring flood protection and drainage are located principally in the flood plains of the Rouge and Mekong rivers, particularly in the delta of the latter river, which forms the greater part of the area of Cochin China. The Mekong is among the world's largest rivers, rising in Tibet some 2,700 miles from the sea. Flood conditions are somewhat similar to those in the delta of the Mississippi. In the control of the Rouge River in Tonkin two conditions are met which require correction: land near the seacoast, which may be inundated at high tide, and improperly drained land, which is only partly protected by dikes, along the river. In the first case dikes are constructed to keep out sea water, and tide gates are installed which allow drainage water to escape at low tide. This sort of construction has reclaimed about 10 square miles of valuable land.

In the reclamation of land requiring flood protection, irrigation and drainage the procedure is somewhat similar to that under the conditions just mentioned, but good results are not so easily attained. The fields are surrounded by dikes to keep out the floods, but since the rivers are in flood more than half the year, rain and other water collecting between the dikes cannot escape. Holding basins must be constructed and drained off as quickly as possible when the opportunity presents itself. Removal of accumulated water is expedited by cleaning, enlarging and straightening the drainage canals and by the judicious location of dikes and gates. Such works have made available about 75,000 acres of land near Hanoi, on which two crops of rice can be raised annually. A scheme of this type on the River Day brought 250,000 acres under cultivation for ten months annually, giving ample time for one crop of rice. The outlet of the drainage channel is controlled by an automatic dam, which closes during flood time in the river. The cost of this project was $2,000,000. Pumping schemes to drain such land have not been installed. Projects for pumping, now under consideration, will reclaim another 75,000 acres at a cost of about $1,125,000. Regulation

of farming methods in conjunction with river regulation is practiced mainly in Cochin China, as the floods come and go with so little velocity and are of such duration that the flooding of rice land under cultivation may do little or no injury.

Cochin China is extremely flat in its lower portion, with a slope of less than 1 in 10,000, the general level being 2 to 3 ft. below the highest tide. At every high tide the land, about 6,000,000 acres, would be inundated were it not for natural ditches that act as dikes and delay the incoming water. In fact, these natural dikes are so effective that they form an obstacle to the escape of drainage water from the land. The daily rise and fall of the water courses assure the possibility of both irrigation and drainage; therefore the principal irrigation works deal with the construction of a network of canals, which, with the aid of the tide, will drain off

Constructing the river terminal for the railroad at Phnom Penh

excess fresh water and will aid in regulating the level of the water on the rice fields.

Irrigation of dry land not subject to flooding is done by damming natural watercourses and diverting the flow, by gravity, upon the dry fields. An early system of this sort, completed in 1908, was constructed in the Province of Bac-giang in Tonkin. It included the construction of a dam 460 ft. long and 230 ft. high, 20 miles of main canal, 20 miles of secondary canal, and 180 miles of minor canal. Pumping systems are under consideration, but none has been installed.

Although the canals are constructed mainly for irrigation and drainage in the lower lands, they are also used for communication and navigation. They become an important part of the travel routes of the country and are particularly valuable in the movement of the rice crop. From the two points of view, irrigation and transportation, the canals of Cochin China constitute an essential factor in the country's welfare. Their construction has progressed to an astonishing degree for more than 45 years. Since 1903 powerful mechanical equipment has been used in excavation. From 1922 to 1926 about $3,750,000 was spent on such work in Cochin China. The total amount of material moved by the French up to the first of the year 1930 was 216,000,000 cu.yd. at an average annual rate, since 1905, of 8,250,000 cu.yd. The annual rate of excavation is increasing, there being 11,000,000 cu.yd. moved in 1929. The cost of excavation has been about 6c. per cubic yard. It is expected that $10,000,000 will be spent on this type of canal construction between 1927 and 1934, and $5,000,000 from 1935 to 1950.

In the canal systems there are about 360 miles of main channel, 130 ft. wide and 8 ft. 3 in. deep, and 1,200 miles of secondary canal 60 to 65 ft. wide and 5 ft. deep. The existence of these canals has placed 5,000 square miles under cultivation at a cost of about $8 per acre.

The value of irrigation is shown by the increased area under cultivation, the increased exports of rice and other products, and the increased price of land. In Cochin China the area under cultivation has increased from 3,000 square miles in 1885 to 8,250 square miles in 1930. The resources of the country have been increased materially and the exportation of rice from Saigon has grown to 1,750,000 tons annually. Thus for an annual expenditure of less than $1,000,000 the wealth of Cochin China has been increased by $3,000,000 annually and the price of land has risen from practically nothing to $100 per acre.

Under the program of 1925 the various irrigation enterprises involved the reclamation of about 3,500,000 acres, of which 3,125,000 acres are in Cochin China, 225,000 acres in Tonkin and 150,000 acres in Annam. It is expected that all the works now projected will be completed in 1950, and that the total expense will not exceed $72,500,00. After the program of 1925 is completed it is expected to spend $50,000,000 to bring in

An irrigation and navigation canal in Cochin China

an additional 10,000,000 acres. The value of the rice fields will be increased in 1950 by about $375,000,000 and 1,000,000 tons will be added to the annual rice exportation.

Highways—There are about 22,000 miles of improved highways in Indo-China, classified as national, local, provincial and communal. The latter two classifications exist only in Cochin China. The simplest form of improvement is known as "terracing," which means that the road has been graded, and, as most commonly required, has been built up above the frequently inundated flood plain. The next step in the road improvement consists of making a macadam surface. About one-half the length of road has been so treated. The best improved roads are of asphalt, of which there are about 500 miles in existence. There is a total length of 6,079 miles on the nineteen different national roads. These are practically all completed, there being about 500 miles in asphalt, 5,000 miles in macadam, and the rest "terraced." There are about 13,000 miles of local or state roads, of which 4,500 miles is macadamized. Construction of pioneer roads has been under way for about five years for the purpose of opening up otherwise inaccessible back country that is known to be fertile and may become available for the cultivation of rubber. Right-of-way for the pioneer roads is carefully selected, usually with the aid of reconnaissance, because of the probability of the road's future importance.

Progress in road construction has been phenomenal during the last twenty years. The most important national highway traversing the country from the Chinese border in the north, passing along the coast to Saigon, the most important port, and thence turning inland to the Siamese border in the west, was no more than a trail, in many places impassable to any sort of vehicle. The route, 1,590 miles long, was completed on Jan. 1, 1925, as a national road at a cost of a little more than $7,000,000. Among the important bridges on this route is the combined railroad and highway bridge over the Rouge River, known as the Doumer bridge. It consists of nineteen spans with steel through trusses, and has a total length of 5,517 ft.

Bridges are generally single track, with an 8- to 11-ft. roadway, designed to carry a 9-ton axle, followed by a 5-ton axle. There are usually two sidewalks, each about 2 ft. wide. Reinforced-concrete beam-and-slab construction is used on the smallest bridges. Bridges with spans of intermediate length are built as low spring arches, and longer spans are reinforced-concrete trusses. Only the longer spans are of steel.

The highways are usually constructed in two stages: first, the grading and necessary culverts and bridges, and second, the macadamizing. The work is usually done by contract in sections 12 miles long, in order that the work may be divided among small contractors. National roads are built to a width of 20 ft., on gradients less than 6 per cent, with curves limited to a minimum radius of 50 ft. except in difficult mountainous country, where the width may be reduced to 13 to 15 ft. Pioneer roads are built to a width of 10 ft., with gradients not exceeding 10 per cent. These roads are only graded and temporary bridges are constructed in timber or bamboo. Macadam may be used in bad places. Very little mechanical equipment is used in their construction.

Ordinary macadam surfacing is made 10 to 13 ft. wide, with 840 to 1,050 cu.yd. of stone per mile. The crown of the roadway is about 1:80. It is difficult to obtain satisfactory road metal near the site of most work where stone is scarce. Brickbats and specially baked clay slugs are used instead of stone. Limestone and laterite are used on the less traveled roads. Granite and other igneous rock are used on only the most important roads. Where the traffic has become so great that even granite would not stand up except at too great cost for maintenance, the road is first widened to spread the traffic and then paved with asphalt. Concrete is not used because of its greater cost. The forms of asphalt paving used are: mixed or sheet asphalt, penetration, and asphalt painted macadam. The last is the most extensively used and has been found satisfactory. It costs from 14c. to 19c. per square yard.

Construction and maintenance are less costly in the north than in the south, where there is the greatest need for new roads. Macadam roads in the north cost about $4,800 per mile to construct and $150 to $240 annually for maintenance, whereas in the south the cost of maintenance is almost double. The annual maintenance cost of earth roads is about $40 per mile in the north and center, and $56 per mile in the south.

River Control—The work of river control is closely associated with irrigation work. It includes the maintenance of navigable channels not directly controlled by irrigation works, some flood protection, the control of tidal currents, navigation, and channel and beacon lights. The length of navigable channels cannot be stated precisely, because of the difference of navigability between

A typical reinforced-concrete highway bridge at Stung Sen

the wet and the dry seasons, the indefinite line between irrigation and navigation canals, and the lack of a suitable definition of navigability. It is safe to assume that there are about 5,000 miles of channels navigable to small steam launches drawing 2½ ft. of water or less. The most important river channels requiring regulation are the Rouge and the Mekong.

The Rouge River is crooked, and the channel changes through the shifting sand bar. It is estimated that 100,000,000 cu.yd. of sand is dropped annually between Hanoi and the mouth of the river. The removal of this quantity of material by dredging is impracticable. At present the channel is maintained by placing mats of fibrous roots to protect strategic points from erosion. In order to protect surrounding land from inundation, the river is completely diked and the river-control work aids in protecting the dikes. Various schemes for the control or the lessening of floods in this river have been studied, but only two, the erection of relief works at certain points in the dikes on the delta and the raising of the dikes, have been put into practice. The form of dike adopted calls for a top width of 20 ft. and slopes of 2 to 1 on the river side and 3 to 1 on the side away from the river. The height of the dikes is designed to give a 19-in. freeboard above the 1918 flood, which gave a 38.7-ft. gage and a flow of 100,000 sec.-ft. at Hanoi. The dikes have been tested to a gage of 36.26 already and it is now proposed to raise them to 40.3 ft. to protect the wet side with an impermeable layer of clay and to construct berms on the dry side.

Floods in the lower Mekong are controlled naturally through the storage provided by the Great Lake, which is tributory to the Mekong through the Tonlé Sap. When the Mekong is high, much of the water flows up the Tonlé Sap into the Great Lake; when the Mekong is low, the current in the Tonlé Sap flows toward the Mekong. The capacity of the Great Lake is so large that the river has been known to flow into it for six months. The problems of river control on the Mekong have to do with the construction of new navigable channels.

The Mekong is navigable as far as Phnom Penh, 200 miles from the sea, at all seasons for boats drawing not more than 16 ft. Smaller boats can navigate as far as Khon, 432 miles from the sea, where the river falls 45 to 55 ft. in 7 miles. A canal has recently been completed around the rapids, making the river navigable to shallow-draft launches for 980 miles to Vientrane, the capital of Laos. Projects now under consideration will make the river navigable for small launches and barges as far as Luang Phra Bang, an important city of Laos, 1,800 miles from the sea at an altitude of 1,016 ft.

Miscellaneous—In harbor work the principal ports to be maintained are Saigon and Haiphong, both river ports; Hongay and Bangoi, deep sea ports; Tourane,

with both a deep sea port and a river port; and seven minor seaports. The work includes the maintenance of channels, the construction of docks and turning basins, the enlargement of the port facilities and the control of traffic. There are about 2,000 miles of coast line to protect from China to Siam. On this coast line there are six lighthouses of the first order, sixteen of the second order and innumerable buoys and other signals.

The cost of the erection and maintenance of all public buildings for general public purposes, such as post offices and railroad stations, including hospitals and elementary schools, is paid from colonial funds. Buildings used for purely local purposes are paid for from local funds. The estimated value of public buildings now in use is $38,000,000.

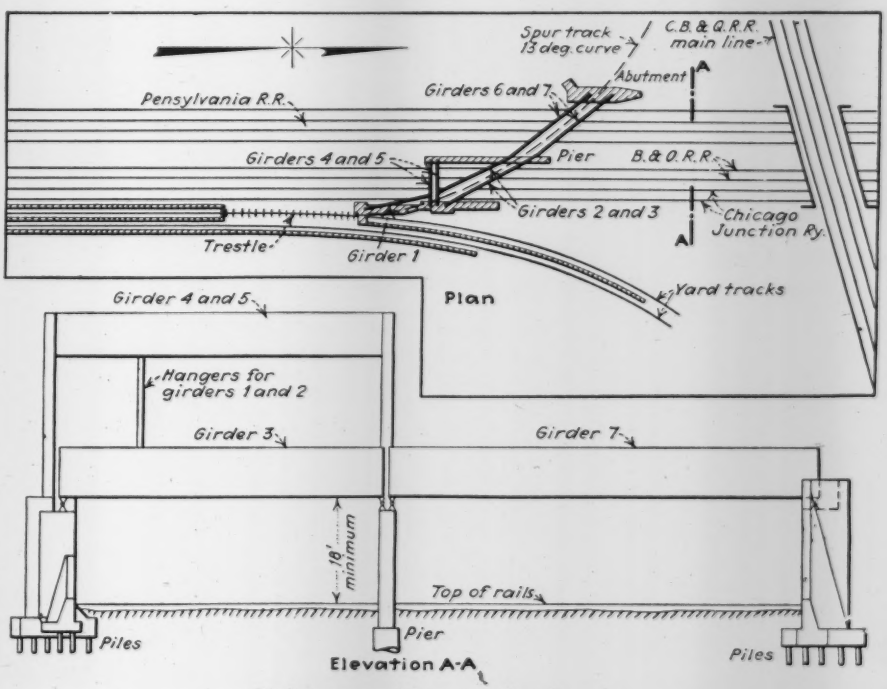
The public works department is responsible for the public water supply and sewerage of all cities. The public water supply is available in practically all large cities, but little progress is being made in the installation of sewerage facilities. The largest municipal water supply is that of the twin cities of Saigon and Cholon, with a combined population of about 370,000. The water is secured from wells with a combined capacity of 2,200 gal. per minute. This is insufficient to supply the growing demand, and plans are now under consideration to increase the available quantity.

Suspended Girders Used to Avoid Pier Between Railroad Tracks

SUSPENDING girder spans over main-line tracks so closely spaced that a pier or column could not be placed between them was the expedient adopted in connection with a grade-separation project on the Chicago, Burlington & Quincy Railroad near Western Ave., Chicago. This road is elevated to cross over the group of main tracks of the Pennsylvania, the Baltimore & Ohio and the Chicago Junction Railway. A spur track on a sharp curve also has to cross these tracks in order to connect with freight tracks beyond them. This spur is on a curve of 13 deg., and its eastern or yard end makes a very flat angle with the main tracks beneath it. It ascends from the Burlington line on a grade of 1.5 per cent and descends to the yard level on a ballasted-deck creosoted-pile trestle of 3 per cent. The situation is shown in the accompanying drawing.

Two through-girder spans are required for this spur-track crossing. The first span, 75 ft. on the square, consists of a pair of 118-ft. girders supported on the west abutment and a center pier between the main-line tracks. In the second span, although only 58 ft. on the square, a 120-ft. girder is required on the outer side of the curve, and this is supported on the pier and east abutment. On the inner side of the curve, which here runs into a tangent parallel with the main tracks, the distance from pier to abutment was so great, nearly 180 ft., that it was impracticable to span it with a single girder. On the other hand, the close spacing of the main tracks did not permit of placing an intermediate column or pier. To overcome this combination of difficulties a suspension arrangement was designed.

The center pier was extended so as to be opposite the east abutment, and on the pier and abutment were erected steel columns carrying a pair of 58-ft. girders, 10 ft. apart, with a clearance of 22½ ft. above the elevated spur track. To each of these girders was attached a suspender or hanger, the two hangers carrying the adjacent outboard ends of an 82-ft. girder seated on the pier and a 95-ft. girder seated on the abutment. These girders are not in line but are set at an angle with each other to accommodate the 13-deg. curve of the spur track. Transverse I-beams on the lower flanges of the girders support a concrete deck. This unusual construction was designed under the direction of A. W. Newton, chief engineer of the Chicago, Burington & Quincy Railroad, and L. W. Skov, office engineer.



Girders suspended over railroad tracks

Bridge girders 1 and 2 suspended from high-level girders 3 and 4. Sharp curve necessitated long span, but track spacing did not permit pier supports.

Modern Tidewater Terminal at Portland, Maine

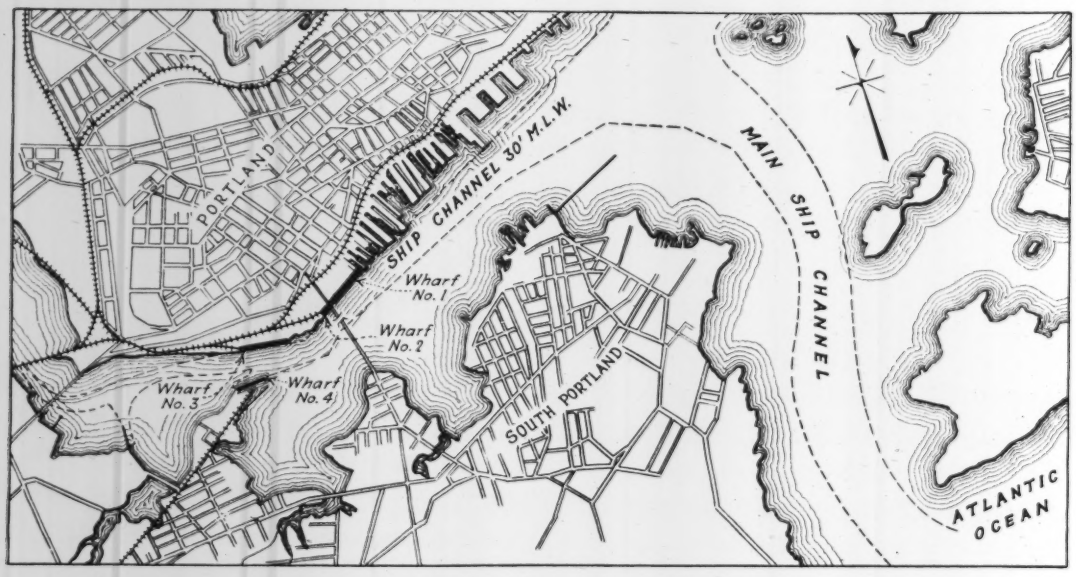


Fig. 1—Portland harbor and Portland Terminal Co.'s wharves

Completion of three new wharves gives Maine port excellent cargo-handling facilities—Special equipment for handling baled pulp, pulpwood, china clay, coal and sulphur—129-ft. wood piles required for coal dock

A DISASTROUS fire in September, 1929, desroying old Pier No. 1 of the Portland Terminal Co., paved the way for the construction of a $2,000,000 tidewater development that now provides the Maine city with excellent modern cargo-handling facilities. Three new wharves have just been completed. One of these is a transit shed for package freight and baled pulp, another is especially equipped for handling pulpwood, lumber and china clay, and the third takes care of coal and sulphur. In the construction of the new terminal more than 3,000,000 bd.ft. of lumber and nearly 8,000 wood piles were used, some of the piles having the exceptional length of 129 ft.

Portland is the chief port of northern New England. Through it pass great quantities of baled pulp, pulpwood, sulphur and china clay used by the paper industries of New England and almost all of the coal required by that section of the country. In 1912 the Portland Terminal Co., a subsidiary of the Maine Central Railroad, was established for the purpose of consolidating the utilities of that railroad and the Boston & Maine Railroad in the cities of Portland, South Portland and Westbrook. The Terminal company provides freight, passenger and waterfront terminals for both railroads, as well as switching and yard service. Fig. 1 is a map of Portland harbor.

The old tidewater facilities of the company consisted of three wharves. Wharf No. 1, 800 ft. long, carried four coal-discharging towers with a capacity of 125 tons per hour each. Coal and sulphur were handled at this dock. This wharf was completely destroyed by fire, along with 2,500 tons of sulphur and twelve steel coal cars. Wharf No. 2, 310 ft. long, carries two coal-discharging towers and an elevated cable tramway covering five tracks. It is used for discharging coal for a local gas company, and was not disturbed in the new terminal development. Pulpwood and china clay were handled by old wharf No. 3, 1,600 ft. long, which carried four wood-handling towers. Waterfrontage of the old wharves totaled 2,770 ft. The new wharves, including old No. 2, total 3,480 ft.

After the fire had destroyed wharf No. 1, Fay, Spofford & Thorndike, consulting engineers, of Boston, were retained to make a survey of the terminal company's waterfront needs. The following report was made, and the recommendations were carried out by the terminal company: (1) removal of an old railroad bridge across Fore River between Portland and South Portland; (2) construction of a new coal wharf, to be known as wharf No. 4, to handle coal and sulphur at Turner's Island, South Portland; (3) construction of a new wharf and transit shed for handling baled pulp and package freight on the site of the old No. 1 wharf; (4) extension and reconstruction of old No. 3 wharf to handle pulpwood, china clay and lumber.

Design of New Wharves

New Wharf No. 1—This wharf is 1,000 ft. long with 30 ft. of water at all times. The waterfront side consists of a wharf apron 40 ft. wide, carrying two railroad tracks. Next to the apron is a three-bay steel and sheet-iron transit shed, 125x792 ft. This shed is partly on the wharf and partly on an old fill. A new concrete retaining wall had to be built along the bulkhead line. On the land side of the shed are two loading out tracks with a total capacity of 34 cars. A storage capacity for 24,000 tons

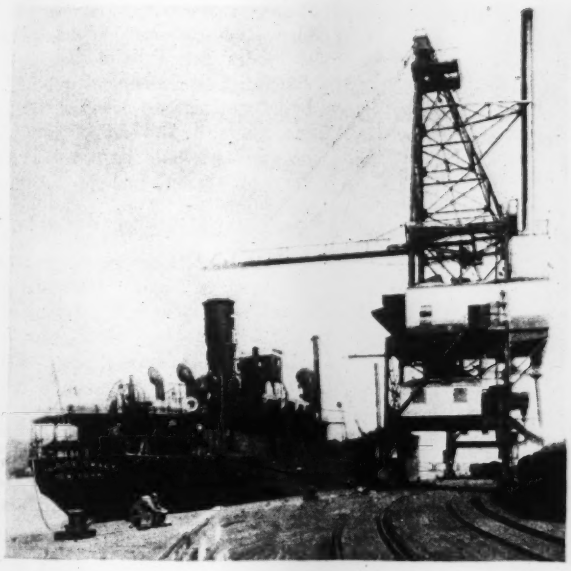


Fig 2—Steam-driven traveling tower, 125 ft. high, unloading coal at new wharf No. 4

stringers are 6x12-in. timbers, and under the outside tracks they are 10x16 in. The entire waterfront side of the wharf is protected by a row of fender piles.

Wharf No. 3—Old wharf No. 3 is almost entirely rebuilt. It is now 1,500 ft. long, with a channel 30 ft. deep along its entire front, and is divided into two sections, each served by an independent set of tracks. The west section, 500 ft. long, is equipped especially for handling china clay and is served by three railroad tracks. A steel frame with 45-ft. Burton masts is located on this section. Hoist lines from the ship's rig are passed through blocks hanging on the Burton masts for the unloading of clay. The clay, loaded into wooden buckets by hand, is hoisted out of the hold by the ship's rig and dumped into portable hoppers on the wharf deck. From these hoppers it is dumped into storage battery trucks equipped with self-dumping buckets, which convey it into boxcars without further handling. The old method of car loading required wheelbarrows, which necessitated considerable piling by hand within the cars. Details of construction of this wharf are shown in Fig. 5.

The east end of wharf No. 3, 1,000 ft. long, carries four electric gantry cranes spanning a car level platform 20 ft. wide (Fig. 4). Equipped with 60-ft. booms, the cranes can load into any of the four tracks serving

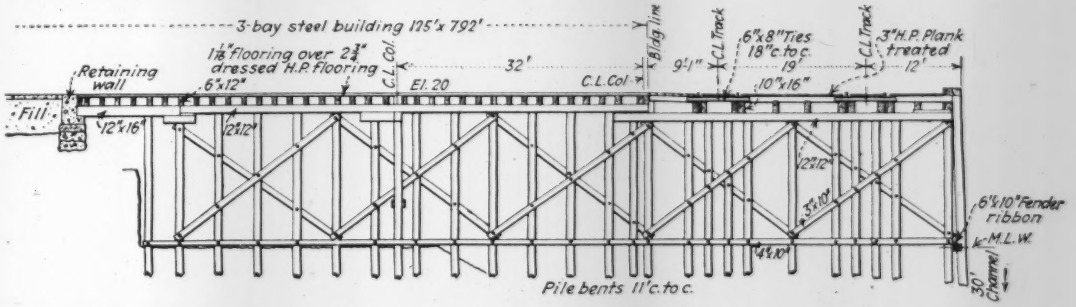


Fig. 3—Piling and timber details of wharf No. 1, which carries two railroad tracks and 125x972-ft. transit shed

of baled pulp is provided by the shed. The entire wharf is designed for a live load of 600 lb. per sq.ft. Over the filled section the floor is concrete, and over the water section it is a 1⅛-in. maple wearing surface over 3-in. planking. The transit shed is equipped with dry sprinklers and is well lighted. Floodlights mounted on 80-ft. masts provide light for the outside wharf.

A large percentage of the cargo passing through this wharf consists of baled pulp. The bales, weighing from 350 to 600 lb. each, are unloaded by ships' cranes and are trucked into the warehouse by hand. Here they are handled by self-propelled electric-drive piling cranes, which pile the bales 14 ft. high. For loading the baled pulp into freight cars, a fleet of high-lift storage battery chisel trucks has been provided. The chisel apron of these trucks can pick up the bales at any height and carry them directly into the freight cars without further handling.

The wharf is equipped with an office building for employees, customs officials and longshoremen. Water lines for supplying the ships with fresh water run to the dock, and telephone facilities are provided for telephone service from the ships' officers quarters. A storage battery charger for charging twenty of the chisel trucks at a time is located in the shed.

The typical construciton of this wharf consists of 26-pile bents set at right angles to the shore line and spaced 11 ft. apart, as shown in Fig. 3. Most of the caps are 12x12-in. timbers. Under the warehouse the

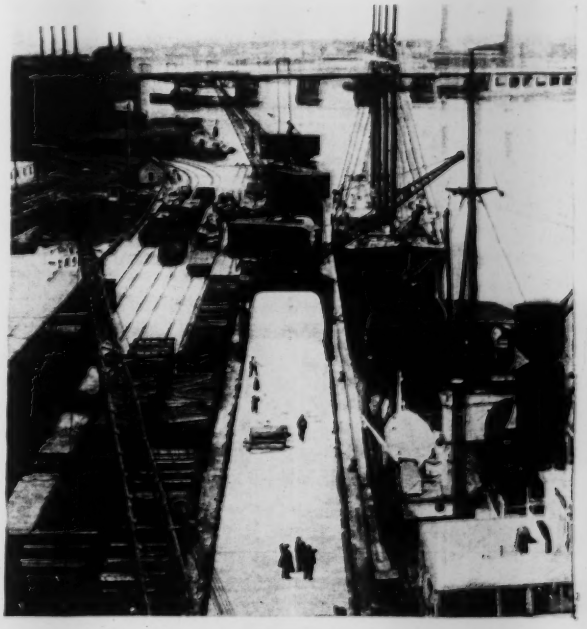


Fig. 4—Electric gantry cranes for handling pulpwood, lumber and general cargo at east section of wharf No. 3

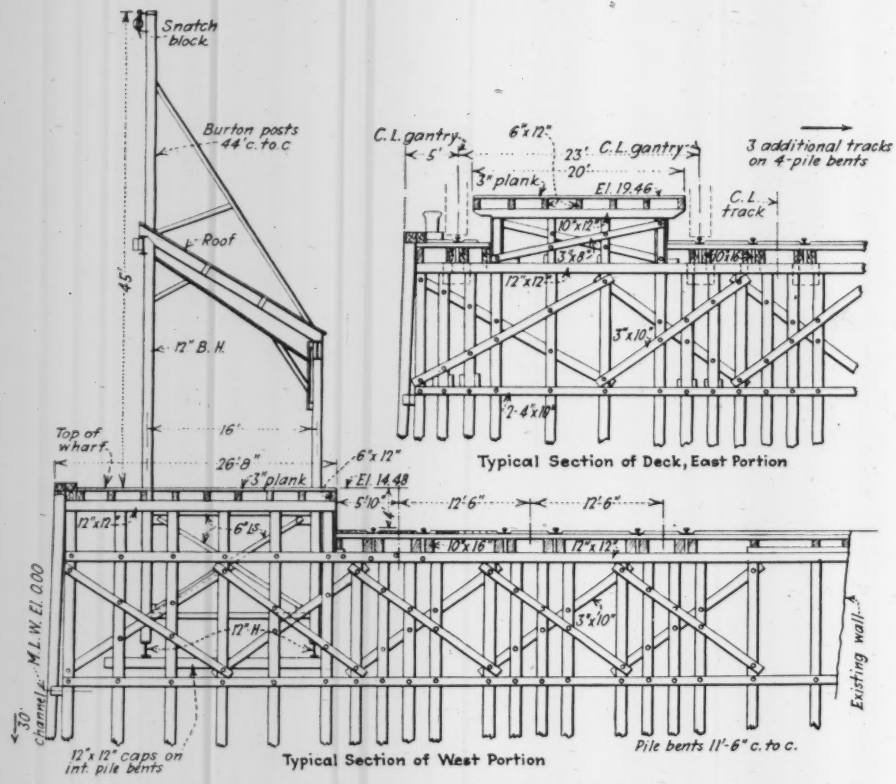


Fig. 5—Typical sections of wharf No. 3 are designed for handling china clay with aid of Burton posts. East section carries four electric gantry cranes spanning car-level platform

this section of the wharf. The cranes have a 10-ton capacity at 30-ft. radius, have a hoist speed of 300 ft. per minute, a revolution speed of 3 per minute, and can travel 150 ft. per minute. Pulpwood and lumber are handled in this section of the wharf. Electrically driven car-hauling cables serve the four tracks, eliminating much switching, otherwise required, by locomotives.

Piling from 65 to 110 ft. long was required for this wharf. A typical bent consists of 26 piles, capped with 12x12-in. timbers carrying 10x16-in. stringers. The waterfront edge is protected by fender piles. The crane rails are carried on oak ties.

Wharf No. 4—Wharf No. 4, especially equipped to handle coal and sulphur, is entirely new, and is built on the South Portland side of the Fore River at Turners Island. It is 610 ft. long and has a 30-ft.-deep channel alongside. The wharf, carrying two crane rails and three railroad tracks, with provision for two additional railroad tracks, is of unusually heavy construction, using piling averaging 115 ft. long, reaching a maximum of 129 ft. Typical bents, of 21 piles, are spaced 6 ft. 8 in., and intermediate bents are placed under the crane rails, as shown in Fig. 8.

The unloading plant consists of two identical steam-driven traveling towers 125 ft. high running on a 30-ft. gage track (Fig. 2). Each tower is equipped with a 3-ton clamshell bucket, capable of making 3½ trips per minute between a ship's bottom and a storage hopper located on the crane. At the bottom of the storage hopper are three steam-operated gates opening into chutes serving the three tracks. The wharf is equipped with cable car movers, and 30 cars can be loaded from one set-up. A total unloading capacity of 1,200 tons per hour is provided by the two towers.

A great amount of sulphur and some china clay are also unloaded at this wharf. A special belt-conveyor rig has been devised to receive these materials from the storage hopper and load them into box-cars.

Construction of Wharves

Major quantities involved in the construction of the three new wharves are: dredging, 320,200 cu.yd.; new timber, 3,192,000 ft. b.m.; new piles, 7,600; old piles removed, 7,200. About half of the piling is Douglas fir, the remainder being longleaf yellow pine. Stringers and ties are of fir, and all deck material is treated Southern pine. All the hardware and bolts are double refined wrought iron.

All of the old piles were pulled by floating cranes. After the piling and timbers had been cleaned out, the sites of the piers were dredged and sloped from bulkhead line to channel line to prevent the possibility of any surcharge of mud on the piles.

All of the new piling, with the exception of a few near to the shore, was driven by floating piledrivers with 86-ft. leads, using a single-acting steam hammer (Fig. 6). The harbor bottom consists of silt and fine clay to an undetermined depth, so the piles carry their load by skin friction alone. At wharf No. 4, 85-ft. piles were used at first. But as the first stick went to grade with twelve hammer blows, it was apparent that this length was inadequate. With the

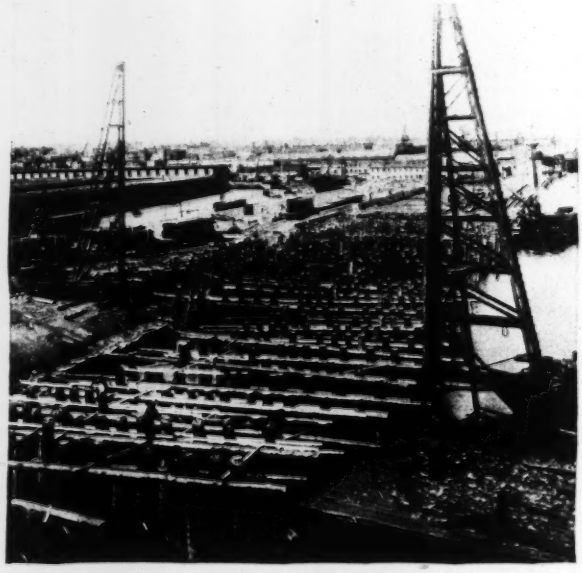


Fig. 6—Part of the 3,200 piles driven for wharf No. 1 with 86-ft. leads

thought that the bottom might stiffen up with the driving of more piles, 150 85-ft. sticks were driven as a test. These proved useless for carrying more than 8 tons each, so they were pulled out and 115-ft. lengths ordered.

Fortunately the terminal company was able to borrow 300 115-ft. piles from the Erie Railroad to permit starting wharf No. 4 until long piles could be secured from the Pacific Coast. These borrowed piles were used to construct a 100-ft. section, which enabled the erection of the coal towers to proceed without delay. Considerable trouble was encountered in starting the long piles within

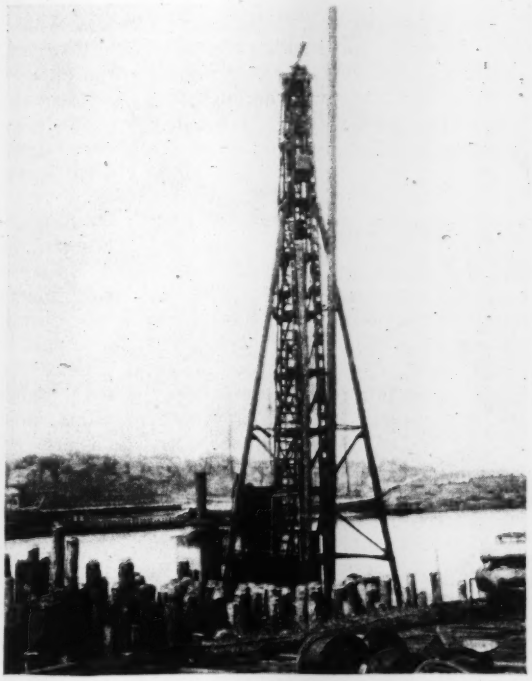


Fig. 7—Driving a 115-ft. pile, wharf No. 4

Pile in leads being used as punch to break through hard crust on harbor bottom. Long pile at side of leads will be dropped into hole left by punch and driven to grade.

the 86-ft. leads. Sometimes it was necessary to set up the piles and pull them down part way with a cable operating through a snatchblock at the foot of the leads to a winch on the driver. At other times the piles were started by lifting them as high as possible and dropping them into the soft mud, the piles sinking by their own weight deep enough to get the pile hammer over the top. But occasionally a stiff pocket of clay was encountered that resisted both of these methods of starting the piling. In these cases it was necessary to punch a short pile through the hard material, pull the punch quickly and drop the pile into place before the hole closed up (Fig. 7). Sometimes piles were forced up with the driving of another pile. Again a pile would follow the hammer up the leads after being driven to grade.

While driving, the piles were kept in line by timber frames. Handsaws were used to cut the piles off at an even grade. All timber and decking was placed from the land side by locomotive cranes.

Organization—The work was handled by the engineering department of the Maine Central Railroad, under the direction of A. H. Morrill, chief engineer. J. B. Trumbull, office engineer, had charge of design and construction. The railroad company furnished all material. The Merritt-Chapman & Scott Corp., New York, had the general contract for dredging, piledriving, timber work, and buildings. W. J. Hepworth was superintendent for the contractor. The dredging work was sublet to the Packard Dredging Co., Providence, R. I. The Blaw-Knox Co. had the contract for erection of the shed at wharf No. 1. Contract for design and erection of the gantry cranes and coal towers was held by the Mead-Morrison Co., of Boston.

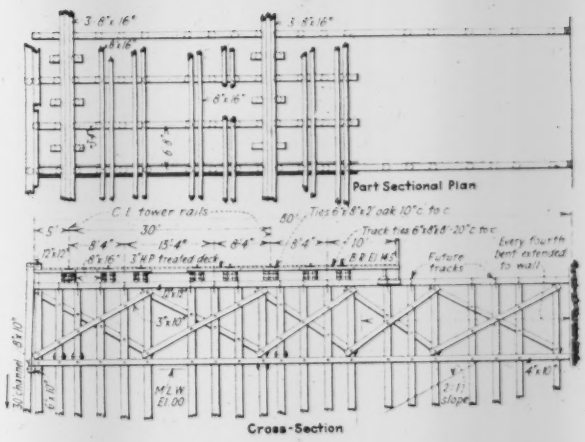
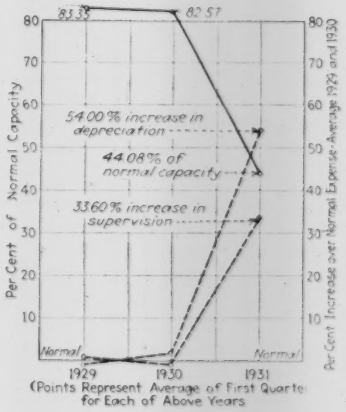


Fig. 8—Framing details for wharf No. 4, which carries three railroad tracks and gantry rails for two traveling coal-unloading towers

Low Production and Unit Overhead Costs

Writing in a recent issue of *The Steel Founder*, publication of the Steel Founders Society of America, H. S. Bartholomew emphasizes how two items of overhead—namely, depreciation and supervision—being relatively fixed in total amount, assume added significance as production volume decreases. The accompanying chart from Mr. Bartholomew's article is based upon operating data from six steel foundries. It will be noted that the percentage rate of normal capacity in production was practically the same in the first quarters of 1929 and 1930 and that the same condition held for supervision and depreciation costs per ton. However, when production dropped to 44 per cent of normal capacity during the first quarter of this year, supervision showed an increase in unit cost of 33.6 per cent, while depreciation showed an increase of 54 per cent. The chart is presented to show the fallacy of using a fixed rate per ton for overhead in quoting prices at the present time. For example, if the fixed expense of supervision is quoted at its 1930 figure of $4.62 per ton, the foundry would lose as much as $1.60 per ton because of this one item. A similar situation exists in the case of depreciation.



Results of declining production

American Engineers in Russia

Comment upon their status, living conditions, technical problems and future prospects

By JOHN M. CARMODY
Editor, Factory & Industrial Management

JOHN M. CARMODY, a keen observer, recently spent two months in Russia studying industrial developments there. His travels about the country brought him into contact with many of the American engineers working in Russia and gave him an opportunity to learn from them of the problems they are up against. Living and talking with them enabled him to get an unusually broad picture of what other American engineers may expect if they go to Russia. His comment will be found of special interest at this time when so many engineers, especially the younger and more adventuresome, are considering the opportunities that Russia may have to offer. —EDITOR.

IN TRAVELING about Russia one is impressed by the tremendous amount of construction work that is being carried on throughout that broad land. Only a few years ago almost 90 per cent of the population of 150,000,000 people lived by agriculture, and only 10 per cent by industry. With very few exceptions, such industrial plants as existed were comparatively small, and the best of them were built and operated by foreigners, largely German, English, American and French.

The determination of the present Russian government to make Russia the equal industrially of the more advanced nations of the West, including the United States, culminated in the widely discussed five-year plan. This plan calls for the construction by the end of 1932 of at least 518 large modernly equipped plants, designed to produce heavy machinery, which in turn will be used to manufacture lighter machinery to produce consumer goods. These plants, of course, include the necessary power plants, which may be separate units, such as Dnieperstroy and Chagress, or integral parts of manufacturing plants, such as Magnetogorsk, Stalingrad, Rostov and others.

This gigantic construction program throws an enormous burden not only on present Russian equipment and transportation facilities but upon the Russian engineering personnel as well. This accounts largely for the fact that in many instances the Russian government has engaged American engineers to assist in the program.

An outstanding example is the experience at Stalingrad. When this plant was projected, at the very beginning of the five-year plan (1928-29), it was planned to erect and equip a plant that would be as modern in every detail as the best automobile plant in America. Russian engineers had already spent considerable time in America and had been impressed, as a result of numerous factory inspections, with American efficiency both in plant design and plant operation. When they were ready to go ahead in Stalingrad, a commission visited America and determined to engage the architect who had designed the Ford plant at Dearborn and the construction superintendent. This construction superintendent, John Calder, told me that within three days after the proposal had been made to him he had signed a contract and had the sailing arrangements made. At Stalingrad he was the only English-speaking man on the job. The steel was imported. He had to train erectors and crane operators. In spite of many handicaps, the Stalingrad plant, designed to produce 40,000 harvester-type tractors per year, was built three months in advance of what was already considered a tight schedule.

This achievement not only redounded to Calder's credit, but it gave Russia a new appreciation of American tempo. Perhaps the experience led Russia to expect too much of American engineers, because the experience of many other American engineers in Russia has not been so happy as Calder's. Herein, therefore, may lie the answer to the question many American engineers have asked themselves: "Should I go to work in Russia?" The fact is that this whole Russian relationship has so many complications that it is difficult to generalize on the question: What makes for success in Russia on the part of American engineers? In contrast to Calder's experience, one could cite many instances of engineers successful at home who have not gotten on well in Russia. Personality plays a very large part here. Technical skill, too, may prove to be a greater factor for success or failure in Russia than it does at home. In the first place, in spite of their previous lack of large-scale industrial experience, Russians are proud people and they have an abundance of self-confidence. Their engineers, particularly those trained by the older methods, are recognized by every American who has done business with them to be highly proficient technically. Their lack of practical experience, however, frequently makes it difficult for American engineers, and particularly practical construction men, to get on with them.

Another element is the proclivity in Russia for long and frequent discussion of details that seem unimportant to men with practical experience on construction jobs in this country. Still another is the tendency constantly to change plans after the job has been started.

The tendency toward delay which is characteristic of Russians—particularly at a time when fear of being charged with sabotage if something goes wrong, tending toward what we call buck-passing—aggravates American engineers accustomed to getting immediate action. This is particularly true with construction men, who since the War have learned the value of time. In other words, in a country where they talk constantly about American tempo and where schedules are tightened frequently on paper, there is yet too little experience to appreciate the need for early and final decision if time is not to be wasted.

Then, too, the relationship of the engineers to the Russian government has something to do with the matter. In some cases American firms have undertaken contracts either to design or to design and supervise the construction of jobs, as well as to supply the necessary personnel. In other cases individuals have gone to work directly for the government through one of the operating trusts.

While generalization is dangerous in this case, as in all others, I got the impression that the American engineer has a better chance for success when he is part of a competent organization than when he is merely an employee of the government. This impression was strengthened by my conversations with Russian directors

themselves, who pointed out that they found it more difficult to get plans changed when they were working with firms than when individual engineers were part of their engineering organizations. In view of the fact that many costly delays may be attributed directly to frequent changing of plans, I think probably (even though they do not care to admit it) that the Russian government is better served by competent organizations than by individuals. But here again there are exceptions. Many of them might be cited in the field of mining engineering, where for the most part the Americans one finds in Russia have already had several years' previous experience as mining engineers in various parts of the globe. This broader experience carries them over hurdles that represent almost insurmountable difficulties to engineers who have not had this broad training.

Employment Contracts

Then comes the matter of contracts, living conditions, language handicaps, etc. The Russian government is already paying a large sum for foreign technical assistance. Almost all of the advanced industrial countries are represented in Russia by engineers, technicians and consultants of one sort or another. So far as I could observe the earlier contracts were more favorable to these foreigners. Russia has taken note of the economic depression in other countries. The Russians are good bargainers; they seek, therefore, to get the greatest possible value for the least possible outlay. This has lead them to submit contracts less favorable than the early ones. The depression likewise has led engineers from other countries to accept less than they would have accepted two years ago. The combination is not particularly happy either for the Russian government or for the engineers who accept these tighter conditions, because once the man is on the job amid conditions that are totally unlike those he expected, he is likely to become a grumbler. The new conditions may not call for less total payment than the old, but the tendency now is to pay a larger part of the total salary in roubles and less in *valuta* (good foreign money). Many of the early contracts called for the payment of the total salary in the engineer's designated home bank, plus his expenses in Russia. Some of them called for 75 per cent in *valuta* and 25 per cent in roubles. More recently contracts have been made on the basis of 50 per cent *valuta* and 50 per cent roubles, or even 40 per cent *valuta* and 60 per cent roubles. This leaves out of account entirely the workmen and other technicians who frequently, from sympathy with the Russian social and economic system, accept full payment in roubles.

Inasmuch as roubles may not be taken out of Russia and therefore have no value outside the country, no foreign engineer really needs more than just enough roubles to pay his living expenses while in the country. If at the end of his contract he has roubles left, he may even squander them, perhaps for something he doesn't need, or throw them away. His net earnings are represented by *valuta* in his home bank.

As I said earlier, many engineers, hard-pressed in their home countries, stand ready to accept almost any sort of reasonable contract and frequently are enthusiastic at the beginning. Their enthusiasm fails when they realize that they are really working for less than they might have earned at home if they had made a serious effort.

Then, too, living conditions are entirely different than most engineers are accustomed to. In spite of all the building that has already been done, it is frequently difficult for these men to get satisfactory living accommodations, especially if they are accompanied by their families. Here again there are many exceptions. Some engineers are quite as comfortably housed as they would be in America. Such is the case in Dnieperstroy and Magnetogorsk. But even here the lack of ordinary recreation facilities to which these men and women have been accustomed leaves something at least to be desired.

The language barrier is overcome by the use of interpreters, to whose loyalty and efficiency almost every foreigner pays tribute.

Technical Problems Uppermost

The greatest difficulty, of course, lies in the field of superimposing foreign practice, especially American practice, on a country which, until two or three years ago, had very little knowledge of modern industrial practice. The Russians want American technique more than anything else. Top officials responsible for the success of the five-year plan and party leaders are so serious about this that one cannot doubt their sincerity. Down the line, however, are men who have not completely abandoned some of the fundamentals of human nature, such as a desire for personal advancement or a desire to see their plans accepted over those of strangers, especially foreigners. It is here that personality and diplomacy play so large a part. It is right here that some of the most technically proficient engineers are likely to fail when men who are scarcely engineers at all achieve success. Russian engineers, after all, are human. They feel they have a greater stake in their own land than outsiders can have and, in spite of all instructions from above to make full use of American technique, they frequently slow up the process.

There is undoubtedly another reason for this, too—namely, that Russia, in spite of all efforts to make it so, is not America. Climatic conditions are different, and it is impossible to throw overboard all tradition. For instance, in some phases of construction Russia has been using timber for generations. Everywhere one is told that a Russian can do more with an ax on a construction job than the average foreign workman can with a complete set of tools—not in the same time, of course, but in the face of handicaps that seem insurmountable to the uninitiated. The Russians have learned to do things with a veneer, for instance, that surprises American engineers. One thoroughly competent American executive told me that we in America have much to learn from the Russians if we are patient.

To me the most important phase of this relationship between foreign engineers and the Russian government is the fact that very few foreign engineers may look forward to a career in Russia. First of all, few of them are in sympathy with the Russian social and economic philosophy. They are there to do a job and earn a living—in fact, to earn enough in a comparatively short time to build up a stake at home that may carry them through long emergencies. Their professional pride and their ethical training prepare them to render a more honest service to Russia than Russia is likely to credit them with being willing to give. This is another factor in the situation. But in very few cases do these men expect to remain in Russia and cast their lot with the Russians. The Russians appreciate this. They therefore look upon the present arrangement as a temporary one.

Engineers Must Be Teachers

Another important factor, and one almost totally overlooked by men considering offers to go to Russia, is the fact that the Russians expect them not only to

be thoroughly competent technically—even more competent than the Russian engineers themselves—but they also expect them to be teachers. Here lies one of the real hurdles. In a country like America, where almost everybody has some conception of mechanical work even when he leaves school, and where we are accustomed to have supervisors and workmen alike learn quickly from daily experience, engineers do not look upon themselves as instructors or teachers. In Russia it is different. Some Americans told me that they sat in conference shortly after their arrival in Russia with as many as twenty engineers, each one a specialist in some phase of the work that the new engineer would be connected with. They plied him with questions day after day, making complete records of the entire conference. He was expected to know everything that was ever achieved or attempted in his general field. Some men are not prepared to stand this kind of test. It may even be that the work they are called upon to do has little relation to the intimate inquiry being made. To the Russians, however, the whole thing is extremely important. It constitutes not only part of their training, but for some of the men down the line who are fresh from school and from books it represents an argument against the need for foreign advice.

Other men sent to set up machines may be heckled by students and young engineers as to the why of this, that or the other phase of the design of a machine that has been developed by experts out of long experience and that has proved eminently successful under severe test in actual production in countries where the machine is not merely the product of one man's mind, but the product of the total experience of an industry. Failure to answer every question according to the book may cast discredit upon the foreign instructor, even though he is only an erector or a production instructor.

Knowledge of Machines Lacking

Then, too, particularly for the construction engineers, there is the Russian's lack of experience with modern construction machinery. A set-up that seems perfectly sane and sensible to the American construction man seems either inadequate or out of place to a Russian. I have in mind one case where a Russian with a single day's experience was put to work on an excavator that cost $40,000. He broke the machine the first day, and it was out of commission several months while being repaired. In the meantime, failure was blamed not on the man's lack of experience but on the design of the magneto. That sort of thing exasperates experienced construction men. On the other hand, on jobs like Dnieperstroy, where the Russians objected in the beginning to modern crane and dumping equipment for concrete work, saying that they could do better with their accustomed methods of hand shoveling and horse hauling, they have been won over completely to modernization and today would not think of going back to the old methods.

No one can say definitey how long it will take to overcome these difficulties. The fact is that Russia is making progress, but the tendency will be to depend as rapidly as possible on her own resources, both human and material, and less and less on foreign experts of one sort or another. This is not likely to happen immediately, because Russia is badly in need of management technique in every phase of her industrial life. But sooner or later she will do what most other countries have done —that is, depend on home resources. In the meantime, engineers who are thinking of going should be careful to know as far in advance as they can whether they have a contract that will continue to be mutually satisfactory, and whether they care to make the sacrifices that almost all engineers make who go abroad for long periods of time.

Decisions in Engineering Law

Reviewed by HERBERT BRAASCH
Attorney at Law, New York City

Decisions reached in cases tried in the higher federal courts and in the state supreme courts are summarized in these articles appearing from time to time in *Engineering News-Record*. —EDITOR.

Accidents Caused by Defects in Design and Construction

A scavenger was killed while shoveling sludge in a cesspool through collapse of the supporting arch, which was constructed from stones of improper shape insecurely cemented with defective mortar. In a suit brought by the scavenger's estate against the owner of the premises it was held the owner of a building or structure in the course of construction who has intrusted the planning of such to a competent architect or engineer and its erection to a competent builder or contractor is not liable for harm done to persons lawfully in the building through its collapse due to faulty design or construction; this is on the assumption that the owner took no part in supervising the construction and that he had no knowledge the structure was inherently dangerous. But the Woodrich Engineering Co., owner, did supervise the construction and hence did have knowledge of the facts. After completion of such structure an owner is liable where he invites others to perform work there, knows or has reasonable ground to believe that there are dangerous defects, and fails to warn parties of the danger and takes no other steps to avert the peril. *Haefeli vs. Woodrich Engineering Co.—New York.*

Breach of Contract Induced by Labor Union

Seymour Ruff & Sons secured the masonry subcontract from Lloyd C. Culler, general contractor for a church in Frederick, Md. The general contractor had a number of jobs, some of which were conducted on an open-shop basis, while Ruff & Sons employed members of Bricklayers' Masons' and Plasterers' International exclusively. To force the general contractor to unionize all his work the union called its membership off the Ruff subcontract, resulting in embarrassing delays in construction. As an ultimate consequence Culler rescinded the masonry subcontract for Ruff's failure to proceed. Ruff lost $25,000 profit, which he then tried to recover from the union as damages for inducing a breach of Ruff's contract with Culler.

It was held that workmen have a right to organize for the purpose of securing lucrative employment under proper conditions as to working hours and wages, and to enforce such right may peaceably strike or quit work. This must be true because, when not bound by contract, every free man has a natural right to work for whom he pleases and to cease when he chooses without liability to his employer. What is a legal right of an individual does not become illegal simply because done in combination with others by concerted action.

Had non-union men been working for Ruff & Sons there is no question that the union would have been within its rights in calling off its membership and, there being no contract as to the length of term of employment, the members could withdraw if they had a real or fancied grievance, even if such action should result in great loss and damage to their employer.

However, organized labor's right of coercion and compulsion is limited to strikes on persons with whom it has a trade dispute. The real grievance was with Culler for not unionizing his work. There was no dispute with Ruff & Sons, and the union owed this subcontractor the duty of non-interference with the conduct of its work so long as there was no contention or dispute with it. Ruff was without power to coerce the general contractor, and even if coercive measures could have been taken by Ruff to compel Culler to employ only union help Ruff still could elect not to do so without penalty for such failure. He is entitled to recover from the union the amount of damages sustained.—*Bricklayers' Masons' and Plasterers' International vs. Seymour Ruff & Sons, Maryland.*

Compliance With Harsh Stipulations of Contract

All the skill, labor, plant and equipment and other work necessary in the construction of a refrigerated warehouse was to be supplied by William Friberg under contract with Elrod & Trimple, owners, who were to furnish the materials. Work set out in plans and specifications was to be paid for at a unit base rate, while extras, if called for, were to be performed at cost plus 10 per cent. The following provisions were also included in the contract: (*A*) The engineer shall be sole judge of the sufficiency of the force employed, the suitability and capacity of any plant and the quality of the work done by the contractor or his employees. (*B*) All corrections of errors or omissions in the specifications or plans may be made by the engineer when such correction is necessary for proper fulfillment of their intention as construed by him. (*C*) All disputes or disagreements between the parties shall be submitted to and decided by the engineer and his decision shall be binding upon both parties. (*D*) Any reasonable modification of proposed plans that does not materially add to the cost of the work to the contractor or any work required because of omissions or incomplete plans shall be performed at the prices bid and without extra payment on account of such changes and omissions.

When the job neared completion the contractor made extensive claims for compensation for such items as: neglect to supply materials when required or at the places provided by the contract; arbitrary changes and alterations during construction to include extensive and costly additions not contracted for; delay in preliminary work, including construction of a road to the job; delay in delivering plans; discontinuance under old plans and substitution of other plans, necessitating reconstruction of forms; conflicting orders interfering with construction; furnishing improper and inferior materials; supplying incomplete plans—all of which the contractor claimed caused him damage, expense and delay.

The contractor contended he was entitled to the "reasonable value of all services performed"—that is, such sum as he would receive if he had been retained to do the work without mention of price. His theory was that the parties materially modified so many particulars as to abrogate the contract. Admitting that such a condition could arise, the court denied that it existed in this case because the contract provided for extras, change of plans, etc., as well as providing "supplemental agreements covering such work which may be made from time to time are made a part of this contract."

Thus the contractor was left to such remedy as he had by the terms of the formal contract. His list of claims and extras was submitted to the engineer, who disallowed them all. On appeal to the court it was held that an estimate of an engineer and arbitrator in such case may be impeached for fraud, by showing that the engineer intentionally underestimated or overestimated the work, or by proof of gross errors in measurements and calculations. As neither fraud nor gross mistake was proved by the contractor, he was consequently bound by the finding of the engineer in so far as it related to actual disputes, since the contract stipulations expressly clothed the engineer with broad irrevocable powers. *Friberg vs. Elrod—Oregon.*

Fire Damage to Buildings Under Construction

The Acme Plumbing & Heating Co., under a contract for alterations and additions to an existing building, installed plumbing and heating materials in accordance with contract specifications. Before completion fire destroyed the building without any fault of the owner or contractor. In a suit the contractor sought payment for so much of the work as he had performed. It was decided destruction of the building terminated the contract and neither party was under obligation to perform further except that the owner remained liable for the value of such work as had been already performed, so long as this conformed to specifications. *Acme Plumbing & Heating Co. vs. Hirsch—Nebraska.*

Another case, which involved the erection and construction of the Pennsylvania State Office Building at Harrisburg under a contract that provided that "the work in every respect from the execution of the contract bond and during its progress until final acceptance shall be under the charge and care of the contractor and at his risk," was decided against the Nelson-Pedley Construction Co., the contractor, when the structure was destroyed by fire. The contract here was held to call for the delivery of a completed building, and the contractor was neither absolved from his contract by the destruction nor was he allowed anything for work performed. *Commonwealth vs. Nelson-Pedley Construction Co.—Pennsylvania.*

Stainless Steel Bolts Support Gas Pipe Subject to Corrosion

Because of its presence in salt water in the neighborhood of chemical plants, it was necessary to pay unusual attention to corrosion resistance in selecting materials for a 24-in. gas siphon under the waters of the Island End River at Everett, Mass., which has just been constructed for the Boston Consolidated Gas Co. by Hugh Nawn, Inc., of Boston. The cast-iron pipe that forms the siphon is supported by two pile bents with a cap over the siphon, using 1½-in. U-bolts 11 ft. long connected to the cap as a support. These were installed by divers working under 30 ft. of water. The bolts were made of Allegheny metal, a chromium-nickel steel alloy, and were fabricated by the Henrici Washing Machine Co., of Boston.

Important Changes Proposed in Uniform Registration Law

Definite educational qualifications for professional engineers and land surveyors are recommended —Satisfactory definition of engineering sought

By T. KEITH LEGARÉ

President, National Council of State Boards of Engineering Examiners, Columbia, S. C.

A UNIFORM registration law for professional engineers and land surveyors was adopted by the American Society of Civil Engineers, the American Association of Engineers and the American Institute of Consulting Engineers in the spring of 1930. It had been prepared by representatives of the major engineering societies and of the National Council of State Boards of Engineering Examiners for use as the basis for registration laws in states not having such laws, or for the guidance of engineers in recommending amendments to existing laws. Subsequent to its adoption by these three national societies the law was adopted and indorsed by a number of local engineering societies and state boards of engineering examiners. The recommended law has been the subject of considerable criticism because it set up no educational qualifications for engineers or land surveyors. Other minor defects also have been found in the law by those studying it or attempting to use it as the basis for new laws. As outlined below by Mr. Legaré, important changes are now recommended in the law. They should receive the careful consideration of the profession. —EDITOR.

AT A recent conference of twenty representatives of national and state engineering organizations certain amendments to the "Recommended Uniform Registration Law for Professional Engineers and Land Surveyors" were carefully considered and adopted. Some of the most important features of future registration laws will be affected by these recommended changes and, in the writer's opinion, will result in great benefit to both the engineering profession and the public when eventually put into operation. Many provisions of the uniform law cover matters of administration and will necessitate changes in order to conform with certain conditions in the various states, and although it is very desirable to have all of these features included in a uniform law, these are not of as great importance as those that should be considered from a national viewpoint, such as definitions, requirements for registration, exemptions and reciprocity.

Because a satisfactory definition of professional engineering has never been compiled, it was thought best to omit any definition from the first printed draft of the uniform law and to leave it for the courts to decide. However, it has since been suggested that if professional engineering cannot be defined by the profession itself, it cannot be expected that others will be competent to do so. This difficult task is therefore being undertaken, and it deserves the interest and cooperation of all real engineers.

Higher standards for engineers have been discussed at length, and definite action toward this goal was taken by the adoption of the revised requirements for registration. A careful study of the proposed changes in section 12 of the uniform law (printed in full herewith) will show that every type of competent engineers is provided for and, without placing hardships upon the engineers of today, a higher standard is established for those of the future. It is important that earnest consideration be given to the proper education and training of young engineers in connection with their registration as professional engineers in the future.

Section 12—General Requirements for Registration: The following shall be considered as minimum evidence satisfactory to the board that the applicant is qualified for registration as a professional engineer or land surveyor, respectively, to wit:

1. As a professional engineer:
   - *(a)* Graduation from an approved course in engineering of four years or more in a school or college approved by the board as of satisfactory standing; and a specific record of an additional four years or more of active practice in engineering work, of a character satisfactory to the board, indicating that the applicant is competent to be placed in responsible charge of such work; or
   - *(b)* Successfully passing a written, or written and oral, examination designed to show knowledge and skill approximating that attained through graduation from an approved four-year engineering course; and a specific record of eight years or more of active practice in engineering work of a character satisfactory to the board, indicating that the applicant is competent to be placed in responsible charge of such work; or
   - *(c)* A specific record of twelve years or more of lawful active practice in engineering work of a character satisfactory to the board, indicating that the applicant is qualified to design or to supervise construction of engineering works and has had responsible charge of important work for at least five years, and provided applicant is not less than 35 years of age.
2. As a land surveyor:
   - *(a)* Graduation from an approved course in surveying in a school or college approved by the board as of satisfactory standing; and an additional two years or more of active practice in land surveying work of a character satisfactory to the board, indicating that the applicant is competent to be placed in responsible charge of such work; or
   - *(b)* Successfully passing a written, or written and oral, examination in surveying prescribed by the board; and a specific record of six years or more of active practice in land-surveying work of a character satisfactory to the board, indicating that the applicant is competent to be placed in responsible charge of such work; or
   - *(c)* A specific record of ten years or more of lawful active practice in land-surveying work of a character satisfactory to the board, indicating that the applicant has had responsible charge of important work for at least five years and provided applicant is not less than 30 years of age.

Provided that no person shall be eligible for registration as a professional engineer or land surveyor who is not of good character and reputation.

In considering the qualifications of applicants, responsible charge of engineering teaching may be construed as responsible charge of work. The satisfactory completion of each year of an approved course in engineering in a school or college approved by the board as of satisfactory standing, without graduation, shall be considered as equivalent to a year of active practice. Graduation in a course other than engineering from a college or university of recognized standing shall be considered as equivalent to two years of active practice; provided, however, that no applicant shall receive credit for more than four years of active practice because of educational qualifications. Any person having the necessary qualifications prescribed in this act to entitle him to registration shall be eligible for such registration, though he may not be practicing his profession at the time of making his application.

Reciprocal registration between states will be a difficult problem as long as existing laws in the various states

have different requirements for registration and while there are states that have no registration laws. With these thoughts in mind and the fact that it may require several years to secure uniformity of registration, the writer recently suggested the creation of a national bureau of engineering registration, which would act as a clearing house in the matter of reciprocity, using as a basis the requirements provided in the uniform law, and developing in connection with registration a system of training for engineering students.

During the past year another state was added to those having engineering registration laws; at least one state amended its registration law to conform with the uniform law as approved last year; and in three states registration acts were passed by their state legislatures but vetoed by the governors because of evident misunderstandings of the importance of the matter. These facts indicate continued interest in engineering registration and the importance of early adoption of a uniform registration law with definite requirements, which can be used as a model for new laws as well as for amending existing laws.

Registration for engineers has passed the argument stage, and the time has arrived for constructive cooperation by all the profession to the end that uniform requirements for registration be set up and that registration laws be made effective in promoting public safety at a minimum of inconvenience to the profession.

Difficult Steel-Cylinder-Pile Foundation Construction

Stone-filled log cribs and uneven foundation—Rock surface wrecks thin-shell piles—Three-quarter-inch and thicker shells recommended for hard driving

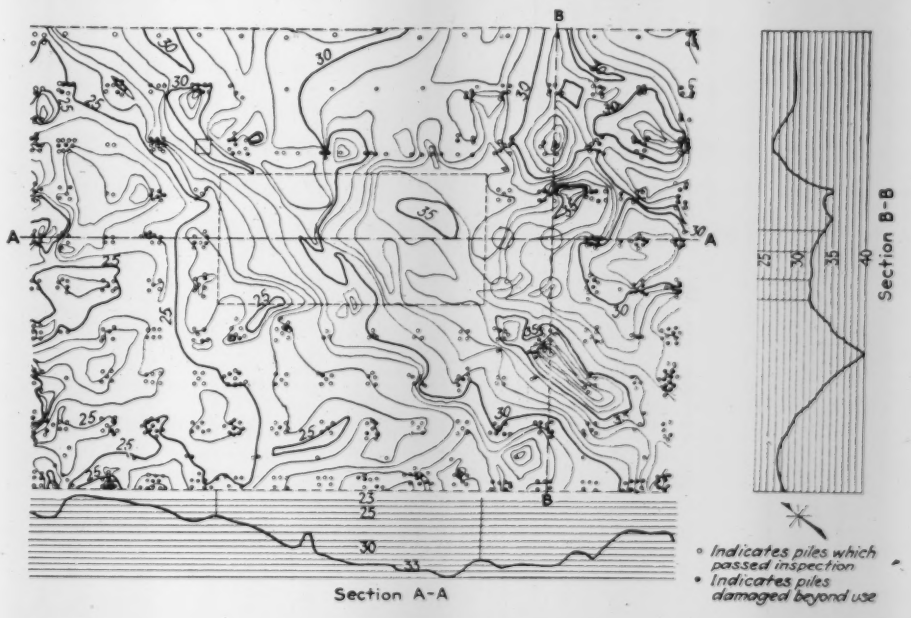
By NEAL A. MELICK
Construction Engineer, U. S. Supervising Architects Office Washington, D. C.

EXCEPTIONAL difficulty in driving steel-cylinder piles and in seating them on irregular rock was experienced in constructing the foundation for the new U. S. Government Assay Office in New York City. From 25 to 45 per cent of the $\frac{3}{8}$- and $\frac{1}{2}$-in. shell, 12-in. piles failed in driving; increasing the shell thickness to $\frac{3}{4}$ and $\frac{7}{8}$ in. reduced the failures. Only 13 per cent of the $\frac{3}{4}$-in. piles and none of the $\frac{7}{8}$-in. piles failed. Bad driving conditions prevailed; at one place they were so bad that piles were abandoned and a timbered open pit was sunk.

Building Structure—The building is 100 ft. high, with five stories, and has granite exterior walls and a steel frame. Basement space is limited to a security vault, foundations for a stack rising 260 ft. above the street and a small area for utility piping. The vault and stack foundations were carried down to rock in open steel sheetpile pits. The remainder of the building, weighing 42,000 tons, is carried on steel-cylinder piles driven to rock, cleaned out and filled with concrete. The grouping of these piles is indicated by Fig. 1.

Ground Conditions — The site of the building is on ground reclaimed from the East River, the shore line of which had been gradually shoved waterward by filling during the 114 years from 1695 to 1809. In extending the shore line, successive structures—possibly bulkhead walls—of log cribwork filled with stone had been sunk in the soft river-bottom mud. Later, as these structures were filled over and built upon pile and timber grillage, building foundations were added to the subsurface structures. This conglomerate of buried structures and earthfill constituted the overburden of the ledge rock on which the foundation piles were to be bottomed.

As the buried structures and irregular rock surface caused most of the pile-shell failures, they are particularized. Figs. 2 and 3 show portions of the cribwork and of



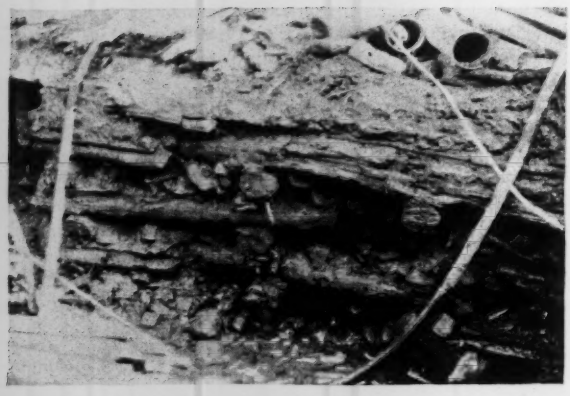


Fig. 2—Old log crib and stonefill overlying rock

Fig. 3—Old building foundation of capped piles

old building foundations. Over the entire site there was a veritable grid of cribs of 10- to 24-in. logs from six to twenty tiers deep, filled with trap rock ranging in size from 5 to 200 lb. Fairly open and densely filled areas were irregular, and some pockets were filled with piles apparently intended for anchorages. Over and through this mass of cribbing were the old building foundations of closely driven timber-capped wood piles.

The rock is indicated only in a general way by Fig. 1. Hard gneiss in vertical stratification is the basic formation. Soft mica schist in horizontal strata overlies the gneiss in places. Hard white granitic quartz and also micaceous quartz exist in places as intrusions. A thin layer of gravel hardpan covers the rock surface, which was disintegrated in places. The chief characteristics of the ledge affecting piledriving was the irregular surface. The general elevation varies, and the surface is a series of ridges, hogbacks, pinnacles, pockets, and seams with vertical and sloping surfaces, and varying in height from a few inches to 5 ft. Fig. 4 shows an area of exposed ledge.

With these conditions of ground the river is only 100 ft. away, and the ground is so porous that tide levels in the river are reflected almost immediately within the site. This required sheeting and continuous pumping in any opening below the water level.

Borings Inadequate—Both ground and rock conditions as described were unexpected. Exploration under the lot was not allowed, and underground investigation was limited to a few core drill-holes in the sidewalks outside the property lines. These indicated rock depths, but they failed to give even a hint of the hidden structures inside the lot lines or of the extreme irregularity of the rock surface. On the evidence of the borings it was a reasonable assumption that cylinder piles could be driven, and they were adopted.

The pile design was based on the New York building code, which permits stresses of 7,500 lb. in the steel and 500 lb. in the concrete and calls for full square bearing on the bottom. Piles 12 in. in diameter with $\frac{3}{8}$- and $\frac{1}{2}$-in. shells were selected and presumptively loaded closely to the allowable limit.

Piledriving and Failure—Speed in construction being required, the contract time limits were made short and piledriving was carried far ahead of excavating and concreting. Generally the piles drove hard, but all surface evidence indicated that the material was being penetrated. A hammer delivering 120 blows a minute and an 8,200-ft.-lb. blow were used. The exposed parts of the piles stood plumb, and there was no evidence of failure until the shells were cleaned out for concreting. Then frequent failure was disclosed. Fig. 5 shows some of the removed damaged pile shells. Most of them were left in the ground, and substitute piles were driven.

The causes and characters of failures disclosed were as follows: (1) deflection of bottom section by immovable timber or stone; (2) tearing and splitting by compact riprap; (3) corking with timber core chiseled out of crib logs; (4) centering over old wood pile and inclosing it all the way down; (5) tearing by stone caught squarely over the end and carried down to rock; (6) crumpling and tearing by small stone under one edge between pile and rock; (7) splitting by landing on sharp rock ridge or pinnacle; (8) crumpling by landing in narrow V depression; (9) splitting by landing half on and half off ridge with vertical side; (10) crumpling by landing on sloping side of ledge.

These failures occurred chiefly in the $\frac{3}{8}$- and $\frac{1}{2}$-in. pile shells. After reconsidering the design of the foundations it was decided to continue with piles of heavier section —$\frac{3}{4}$- and $\frac{7}{8}$-in. shells. This did not eliminate all trouble, but it was a decided improvement. With a hammer delivering a 15,000-ft.-lb. blow, the heavier shell broke timber, shoved stone aside and smashed small stone

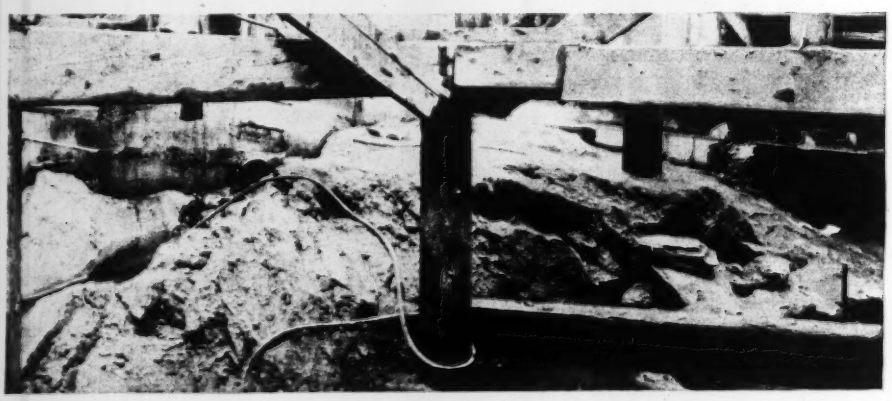


Fig. 4—Broken and irregular rock surface

Fig. 5—Removed damaged pile shells

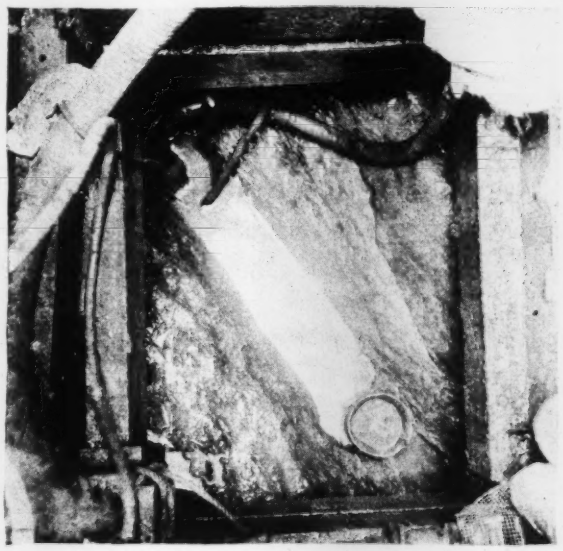


Fig. 6—Wedge crevice in foundation rock

caught between shell and ledge. Such destruction as occurred was kinking or crushing when the shell struck sloping surfaces or narrow crevices in the ledge. At one place the cribfill was so compact and the rock surface so broken in steep slopes as completely to wreck all weights of piles, and an open pit was sunk, as shown by Fig. 6.

Blowing Out and Seating Shells—Blowing out and seating the pile shells was a painstaking and often tedious task. After blowing out, an electric lamp was lowered into the shell and rigid inspection was made to disclose shell defects and to insure a square seat on solid rock. Redriving, chiseling, sounding and core boring were means employed to secure solid pile bearings.

Conclusions From Experience—Summarizing the experience with the Assay Office foundations the following conclusions are given:

1. Open-end steel-pipe piles can be driven through almost any formation that will yield to any extent.
2. They can be seated satisfactorily, generally on any type of rock surface formation.
3. Rock surfaces that are decidedly broken up will cause occasional failures of even the heaviest pile.
4. The shell should be of sufficient thickness of wall to transmit a dynamic energy of a minimum of 15,000 ft.-lb. to the rock surface in order to penetrate hardpan, disintegrated rock and soft rock, and to seat fully on hard rock without deformation other than a flow of the steel at the point to fit closely to the rock surface.
5. The thickness of metal in the shell should be not less than $\frac{3}{4}$ in.
6. The weight of the shell should be designed for driving capacity only.
7. The presumptive bearing capacity of the pile should be provided by the concrete only.
8. The allowable stress in the concrete should be 1,000 lb. per square inch.
9. For subsurface formations of the type described herein, piles of this type are much less expensive than open, or compressed-air, caissons.

Personnel—The general contractor for the work was the Great Lakes Construction Co., of Chicago. The subcontractor for the piledriving was the Pierce Steel Pile Corp., of New York. The writer was in charge for the government, with Nels Hansen, Willard S. Duckett and Ralph J. Gurfield as assistant construction engineers.

LETTERS TO THE EDITOR

Method of Supporting Forms Patented

Sir—Your issue of July 30 contains an article by Eugene B. Stokes describing falsework supported on permanent columns by means of structural-steel beams supported on castings attached to such columns.

The object of this letter is to call attention to the fact that I hold a patent for this type of falsework granted to me in 1919. This should have been common knowledge because of the publication of material in this connection, notably in *Engineering News-Record* of Nov. 15, 1928, in an article by the late W. H. Speirs, describing this type of falsework as used on the Hackensack River bridge approaches of the D.L.&W. Railroad Co. There was also an article by me in *Engineering & Contracting* of May, 1929, describing various uses of this falsework design.

M. HIRSCHTHAL,
Concrete Engineer,
D.L.&W. Railroad Co.

Hoboken, N. J.,
August 1, 1931.

Public Works and the Depression

Sir—This fall we are faced with an emergency in respect to unemployment, in which we, as engineers, need to have a clear-cut opinion on the question of public works. The following observations are submitted as a tentative basis for discussion.

1. It is too late to wish we had a system of timed public work.
2. Any kind of construction unquestionably puts buying power into the hands of laborers, who then become a market for goods.
3. Business is likely to revive but little unless there is a considerable amount of construction to be done.
4. Private holders of funds are afraid to go ahead. Either the government must do it or business will stay dormant.
5. There is no feasible way now for the government to get funds except by selling bonds.

It is therefore evident that, failing a spontaneous recovery this fall, there is no way to ease the situation except for the government to borrow money and push construction on a grand scale. There is talk of cutting public expenses, but this is like cutting off the oil because the engine is dry.

The foregoing observations and conclusions seem inescapable under present conditions, so long as private capital remains paralyzed. And in turn they lead to two very unpleasant reflections:

First, we are running out of plans. Everyone who has dealt with public authorities this year has doubtless been conscious of the drive to push existing works to comple-

tion, and the snail-like delays in getting new plans on the boards. The situation demands that the authorities wake up to the fact that action directed toward helping the construction market is imperative this winter. That means speeding up plans, and it means a sincere search for jobs of road repair, etc., which can be rushed into the market without months of planning. The situation demands action, and it has teeth.

Second, who is going to pay the bills? Some day the bonds issued to provide present emergency construction must be paid. We shall have to begin to think about taxation. Taxes on sales and on real estate come out of business in the end; they cut buying power, shorten prosperity and lengthen depression. Graduated estate and income taxes do not come out of buying power but out of that oscillating mass of liquid funds that we now see clogging the banks. It is something to think over. There is only one answer.

Farther in the distance there looms up still another unpleasant thought. When the Hoover Dam is finished, how many more farms will there be? Are we just building more farms for the fun of urging more farmers to cut their acreage? Sometime we must begin to think of the ultimate effect on prosperity of the things we build. I submit this proposition for discussion:

A "productive" unit, such as a farm, is not "useful" if its products are unsalable wheat and uncollectible mortgages. An "unproductive" unit, such as a park, is "useful" if its products cause better living conditions and no competition with private business.

Business this fall needs stimulants as well as food, but it will be well to begin recognizing that there is a difference.

In summary, it is necessary that engineers advocate the rapid extension of public work to take up the slack in private work. If we are to do that intelligently, we must extend our ideas of engineering in both directions. It is not enough to see where a bond issue will come from to finance a project; behind that we must see where the money will come from without strangling business. It is not enough to see that the project will stand up and do its work; beyond that we must see whether the work it does will hurt business. These are serious times. We had better broaden our thinking.

DAVID CUSHMAN COYLE.

New York, N. Y.,
July 28, 1931.

Multiple-Span Suspension Bridges

Sir—The proposal for a multiple-span suspension bridge type of structure for the San Francisco-Oakland bridge and the studies made on a variation of this type of structure with a horizontal tie (see *E.N.-R.*, Jan. 15, 1931) are evidence of a renewed interest in its possibilities. It is interesting to note that several of the pioneer suspension bridges in this country were of the multiple-span type. Two of these bridges, built by John Roebling, were located at Pittsburgh, Pa. One carried the aqueduct of the old Pennsylvania Canal over the Allegheny River at Eleventh St. and the other crossed the Monongahela River at Smithfield St.

Aside from the multi-span feature, the construction of these bridges certainly contributed to the art and knowledge of suspension-bridge building. The information which follows bears this out and also affords one the opportunity of comparing the practices of 85 years ago with present methods:

	Suspension Aqueduct	Smithfield St. Bridge
Date built	1844	1846
Date dismantled	Between 1857 and 1864	1883
Roadway or waterway width (ft.)	16.5	20
Sidewalks	....	2 at 5 ft.
Number of spans	7	8
Average length center to center (ft.)	160	188
Sag (ft.)	14.5	14.0
Number of cables	2	2
Diameter of each cable (in.)	7	4.5
Number of approx. ⅛-in. diam. wires per cable	1,900	750
Dead load (lb. per ft. of bridge)	1,812*	744
Live load (lb. per ft. of bridge)	3,440*	426
Working stress in cable (lb. per sq.in.)	14,800	18,500
Average ultimate strength of wire (lb. per sq.in.)	79,000	82,200

*The "trunk" was 16.5 ft. wide at the top, 14.0 ft. at the bottom and 8.5 ft. deep and was designed to support its own weight. The cable was designed to carry the load from 4 ft. of water in the "trunk."

The cost of the aqueduct was $62,000, including the removal of the old wooden structure and revisions to the piers. For the Smithfield St. bridge the cost was $55,000, including revisions to the piers. Both bridges replaced wooden structures, that of the latter having been destroyed in the great fire of 1845.

The suspenders for the Smithfield St. span were of charcoal iron 1.5 in. in diameter and spaced 4 ft. centers. Diagonal stays of 1.25 in. in diameter were used.

Over the piers the cables for the aqueduct were constructed with swells made by introducing short wires at two points. These swells were wedged into corresponding recesses in the supporting saddles, thus fixing the cables to the piers. For the Smithfield St. spans the cables were attached to the towers by pendulums 2.5 ft. long. When a heavy load passed over any span, the maximum movement of the adjacent pendulum was observed to be not over 0.5 in.

On both of these bridges, in the words of their builder: "Oxidation is guarded against by a varnish applied to each wire separately. Their preservation, however, is insured by close compact and continuous wrapping made of annealed wire and laid on by machinery in the most perfect manner. A continuous wrapping is an important improvement, which in this case has for the first time been successfully applied."

It is of interest to consider the changes and advances in practice after a lapse of 85 years as regards unit stresses, loads, size of wires and cables, suspenders and suspender spacing, diagonal stays, stiffening girders and cable protection. The continuous wrapping of wire cables by machinery, commonly used today, was a contribution from the first of these bridges.

The foregoing does not take account of the Sixth St. suspension bridge built in Pittsburgh in 1859 by John Roebling, which had two main spans. A photograph of this structure was published in *Engineering News-Record* of April 16, 1931, p. 662.

J. C. ADAMS,
Design Engineer.

Pittsburgh, Pa., July 23, 1931.

Concrete Lining for Irrigation Canals

Sir—The article by A. J. Moore, on concrete lining for irrigation canals in Texas (*E.N.R.*, July 9, 1931, p. 60) gives some very interesting information. The writer as division engineer for R. S. Fessenden, general manager and chief engineer of the Mercedes district, had direct charge of the design, location and construction of the canal lining in that district, gunite lining being used throughout the entire work.

The lined canals in this district were nearly all of the circular or modified circular section, had only a 2-in. freeboard and were all finished by troweling. It was thought when the specifications were prepared that the trowel finish would materially reduce the coefficient of friction. This was found to be the case, although the fouling of the walls of the canal by moss and deposited silt increased this coefficient to some extent. As far as could be determined, the troweling did no material damage to the gunite.

The gunite was mixed in the proportion of one sack of cement to 4½ cu.ft. of loose dry sand, correction being made for water content in the sand with the resultant bulking. Electrically welded wire mesh, with 4-in. transverse spacing and 8-in. longitudinal spacing, of No. 12 wire was used. New specifications require the use of 6x6 in., No. 14 wire, which it is believed will give better results. Field outlets were gunited in place in the lined canal.

In the Mercedes district the lined canal was placed in one of the banks of the existing earth section and fills were made to existing head gates and checks where these structures were properly located for the economical delivery of water. Some 85 miles of the district's canal system were lined under the writer's direction and plans are under way for the lining of more than 100 miles more.

A very marked fall in groundwater level followed the construction of these lined canals and a considerable acreage of waterlogged land was reclaimed.

CLYDE L. HUFF,
Consulting Engineer.

Missouri Valley, Iowa.
July 16, 1931.

NEWS OF THE WEEK

Bids for Chicago Post Office

John Griffiths Sons, 288 North La Salle St., Chicago, was the low bidder for the construction of the new air-rights post office building in Chicago, with a bid of $13,624,970 and an alternative bid of $13,606,970. The structure is to be 800x344 ft. in size, with a height of nine stories and twelve-story pylons at the four corners. Other bids were: Paschen Bros., Chicago, $14,225,000 and $14,206,000; B.-W. Construction Co., Chicago, $14,239,000; George A. Fuller Co., New York City, $14,426,000 and $14,408,000; Henry Erickson, Chicago, $14,990,000 and $14,970,000; Aaron Fried Co., New York City, $15,087,500 and $15,073,000. The opening took place Aug. 10. Graham, Anderson, Probst & White are the architects.

Headings Holed Through on 46-Ft. Power Tunnel

Two headings in a 46-ft. section of the 16,000-ft. tunnel being driven by the New-Kanawha Power Co. near Hawk's Nest, W. Va., were holed through on Aug. 12. The headings met in the 7,000-ft. length between an adit and the lower portal. The 9,000-ft. length between the adit and intake portal will be holed through in five or six weeks. Diameter of the finished tunnel will vary from 32 to 46 ft. In the 46-ft. sections a 12-ft. bottom bench has been left while driving through a top heading. Rinehart & Dennis are driving the tunnel and are building a diversion dam and power house on New River at the intake.

1,400 Men Laid Off at Hoover Dam After Demand for $5 Wage

WORK on the main Hoover dam contract has been suspended indefinitely by Six Companies, Inc., and the crews laid off. This action was precipitated by a strike on Aug. 7, when workmen demanded a $5 minimum wage. Working efficiency had been so reduced by the excessive temperatures that the shut down was not an unexpected move. With the contract already ahead of schedule, according to the company officials, the shutdown will not delay the project as subcontracts and work on housing and transportation facilities will continue.

With an average maximum daily temperature of 120 deg. during July, working efficiency was so low that the contractor would have preferred to suspend work and wait for cooler weather, but continued operations to maintain employment for the crews.

Tunnel driving had progressed to the point of installing mucking machines and as a result about forty muckers were relieved of tunnel work, but given outside jobs at a $4 wage. The wage for tunnel work is $5 with miners receiving $5.60. Leaders among the men called a strike demanding a $5 minimum wage with $5.50 for tunnel work and $6 for miners. The request for a wage increase was firmly turned down and the crews laid off.

Other demands of the strikers regarding improved housing conditions

(Continued on page 274)

San Gabriel Bonds Released for Other Flood Control Work

A decision of the California supreme court announced July 31 establishes the legality of the plan of Los Angeles County to utilize $22,200,000 of flood control bonds for flood control projects other than those for which the issues were voted. The county has on hand approximately $21,000,000 worth of unsold bonds voted for the construction of the proposed San Gabriel Canyon high dam and $1,200,000 left from other projects completed below the estimated costs. Construction of the San Gabriel high dam project was abandoned early in 1930 because of earth faults discovered at the site. Approximately $4,000,000 of a $25,000,000 bond issue voted for the project had been expended.

Proceedings before the state supreme court were begun last February in the form of a test suit to determine whether the bonds could be issued for a purpose not specifically described in the proposition outlined on the ballots used by voters who indorsed the bond issue.

Exploration work in the San Gabriel Canyon on a project to build three flood control dams has been under way for some time and E. C. Eaton, chief engineer for the Los Angeles county flood control district, has prepared for the immediate resumption of flood control work on a large scale.

Mr. Eaton has recommended to the county board of supervisors that an engineering consulting board consisting of Louis C. Hill, A. J. Wiley, Robert T. Hill and Prof. C. F. Tolman be engaged to supervise the final exploration work on the San Gabriel projects.

TWO NEWLY-COMPLETED STRUCTURES ON THE MOKELUMNE RIVER DEVELOPMENT OF THE PACIFIC GAS & ELECTRIC CO.

Salt Springs dam, located in the gorge of the Mokelumne River, which is 328 ft. above streambed, with a crest length of 1,300 ft. It is of the rock filled type and required about 3,000,000 cu.yd. of material.

Tiger Creek power house, equipped with two generating units each developing 30,000 kva. Each generating unit is served by two 36-in. penstocks. Each water wheel unit consists of two overhung impulse Pelton wheels rated at 18,000 hp.

Government Building Contract Let After Long Delay

Three months after the opening of bids, Interior Department officials on Aug. 1 formally approved the award of a contract to the W. P. Rose Co. of North Carolina for the construction of a tuberculosis hospital near Washington. Although the Rose company submitted the lowest basic bid of $240,000 the Interior Department sought to award the contract to the Adams Construction Co. of Washington, which agreed to do the work in sixty-five days less time than the Rose Company.

The Interior Department was believed to have been influenced in its desire to avoid awarding the contract to the Rose company by protests from labor circles. It was contended by labor organizations that the Rose company employed large amounts of outside labor and, in past cases, had refused to pay existing wage rates. The Comptroller General was asked for his opinion on the matter. On June 26 he sent a letter to the Secretary of the Interior in which he stated that the time element in this case was not a sufficient basis for awarding the contract to other than the low bidder. Since June 26 the Interior Department has been holding the matter in abeyance. The project involves the building of a two-story tuberculosis annex at the St. Elizabeth's Hospital across the Anacostia River in Washington.

Inventor of Cameron Septic Tank Dies in North Vancouver

Donald Cameron, after whom the Cameron septic tank for the treatment of sewage was named, died at North Vancouver, B. C., on July 26 at the age of 79 years. He was born in Scotland. He was city surveyor of Exeter, England, from 1883 to 1903, when he resigned. In or about 1907 he went to Vancouver, B. C., and became a member of the engineering firm of Cleveland and Cameron, which was dissolved in 1916. Mr. Cameron continued engineering practice, devoting himself chiefly to municipal work. As a resident of North Vancouver, Mr. Cameron was an alderman and also an executive of the local board of trade.

It was while city surveyor of Exeter that Mr. Cameron developed a method of sewage sedimentation with partial digestion of the resultant sludge which he named the "septic" tank—first a small trial installation, put in use on March 31, 1896. In 1897 the city applied to the Local Government Board for approval of a loan for septic tanks, contact beds and intercepting sewers to serve nearly the whole city. The tanks were put in use about Christmas, 1901, the contact beds some three months later. A formal opening took place on Aug. 13, 1902. Subsequently, the use of the septic tank spread through the world and from it the two-story tank was evolved by Dr. Travis, of England, soon to be improved by Dr. Ing. Karl Imhoff, of Essen, Germany, and given his name. The firm of Cameron, Commin & Martin, London, England (of which Alfred J. Martin, consulting engineer, London, was a member) was organized to render engineering service in sewage disposal.

While at Exeter Mr. Cameron organized and became an officer of the Devon and Somerset Engineers. In 1911 he assisted in organizing the Sixth Field Company, Canadian Engineers. Six of his sons were in the late war and the seventh in training at its close. One son lost his life. Five of the surviving sons are engineers.

M-K-T Absorbs Oklahoma Farmer-Built Railroad

The 105-mile Beaver, Meade & Englewood R.R., in Oklahoma, has been purchased by the Missouri-Kansas-Texas Lines, and became a part of the latter's system in July. Some twenty years ago farmers around Beaver, Okla., started a railroad through the wheat-growing district and built seven miles to Forgan to connect with the M-K-T; in 1924 it was extended west to Turpin, 27 miles, and in 1926 to Hough, 65 miles, while in 1930 a 40-mile extension carried it to the Santa Fe at Keyes, Okla. The line crosses the Rock Island at Hooker, Okla. Its objective point was Des Moines, N. M., on the Colorado & Southern and also the terminal of a Santa Fe branch. Since the purchase, the M-K-T has been improving the roadbed and structures to carry heavier equipment.

California City Withdraws From Water and Power Districts

Citizens of San Bernardino, Calif., voted Aug. 4 to withdraw from membership in the Metropolitan Water District of Southern California and also rejected a proposal that the city contract with the federal government to purchase electric power from the Hoover Dam power plant. The vote on the proposition that the city withdraw from the water district was: yes, 3,052; no, 972. On the power purchase proposal the vote was: yes, 1,048; no, 2,896. The election was called by the city council after hearing assertions that San Bernardino would not receive adequate benefits in proportion to the cost of participation in plans of the Metropolitan Water District to bring water to a number of Southern California cities from the Colorado River. San Bernardino was among the first cities to join the water district and also was included in a group of Southern California cities, other than Los Angeles, originally designated by the federal government as Hoover Dam power allottees. San Bernardino was to receive a share of the 6 per cent of the power allocated to these cities.

Pennsylvania to Build Dam at Head of Shenango River

Bids will be opened Aug. 15 by the Pennsylvania State Water and Power Resources Board, Harrisburg, for the construction of the Pymatuning dam, located on the headwaters of the Shenango River about 80 miles north of Pittsburgh. Specifications call for 370,000 cu.yd. of embankment, 180,000 cu.yd. of excavation, 9,000 cu.yd. of riprap, 5,000 cu.yd. of concrete, 4,000 cu.yd. of stone paving and 900 tons of steel piling. The dam will consist of an earth embankment 2,400 ft. long and 50 ft. high, with a concrete spillway. It will create the largest artificial lake in the state, 16½ miles long and 2 miles wide, with a capacity of 74 billion gallons.

The primary purpose of the reservoir thus formed is to provide sufficient water during dry seasons for domestic and industrial use in the Shenango and Beaver valleys, but it will also serve to reduce flood volumes. During summer months over one-quarter of the flow of the Shenango River at New Castle and Sharon is pumped for domestic purposes, while industrial plants make extensive use of water in the pools. At times the total pumpage along the river is eighteen times the flow, necessitating repeated re-use and often raising the temperature of the water to 140 deg.

Seek Bar to Construction of Incinerator in Zoned Area

Award of contracts for the construction by the town of Greenburgh, N. Y., of an incinerator on a site within an area zoned for first class residential use has been delayed by a temporary restraining order obtained by a group of residents. The case is unusual in that it represents an attempt by citizens to force a town to obey its own zoning restrictions. Trial of the action is expected to take place this fall.

Propose Bridge at Vancouver, B. C.

A combined railway and vehicular traffic bridge across the Fraser River, in British Columbia, immediately east of Port Mann on a direct line of communication between Vancouver and the south has been proposed by the Fraser River Bridge Co. Authority to build the bridge will shortly be sought from the federal government. A double-deck steel structure, with a span of 1,000 ft. across deep water and the necessary approaches on each side, is proposed at a cost of $2,700,000. Present plans call for the three lanes of vehicular traffic on the upper deck, and the suggestion has been put forward that the Canadian National Railways solve its problem of a permanent entry into Vancouver by using the lower deck.

Wide World Photo

LONG SWING SPAN A FEATURE OF NEW ILLINOIS BRIDGE

Calhoun County, Ill., located between the Mississippi and Illinois rivers about 50 miles northwest of St. Louis, is now connected with the outside world by the new Joe Page bridge at Hardin. This structure has a lift span 309 ft. long, weighing 556 tons, across the main channel of the Illinois river. Although said to be the richest county per capita in the state, Calhoun County has no railway connection; hitherto it has been necessary to ship an average annual crop of 800,000 barrels of apples entirely by ferry or river packet.

California to Study Water Resources Conservation

A joint committee of fourteen members representing the California legislature has been appointed to investigate the water conservation problem from the economic, statutory and constitutional angles and for the submission of a definite program to be considered at a future meeting of the legislature. This action has been taken following the governor's declaration that he will call a special session to forward a plan of water resources conservation.

Treasury Reports on Progress of Federal Building Progress

What has been accomplished during the period from May 15 to July 15 on that part of the government's building program supervised by the Treasury Department is revealed in a report recently made public. The data are summarized in the table given herewith. On Aug. 4 President Hoover, in commenting upon the report, predicted that by autumn projects aggregating $300,000,000 in value will be under contract.

STATUS OF FEDERAL BUILDING PROGRAM

	As of May 15		As of July 15	
	No. of Buildings	Amount	No. of Buildings	Amount
Buildings completed	51	$23,516,876	57	$25,326,876
Contracts let	150	120,213,900	192	135,637,366
Sites acquired, plans completed and in process of being contracted	56	20,097,000	61	44,249,800
Sites acquired, plans partially completed	90	192,173,723	192	181,353,023
Sites acquired or in negotiation	115	50,622,941	100	32,301,841
Sites advertised, bids opened	196	46,494,800	156	34,871,800
Authorized program			758	453,000,000

Study Baltimore Airport

Bancroft Hill and W. Watters Pagon, consulting engineers of Baltimore, Md., have been appointed by Mayor Howard W. Jackson of that city to make a study of the municipal airport project and to report their findings and suggestions to Bernard L. Crozier, chief engineer. The Mayor made the appointments following receipt of a report from the Commission on Governmental Efficiency and Economy. This report pointed out that although almost $3,000,000 has been spent on the project during the previous municipal administration, the airport is far from being completed. The commission recommended that engineers be engaged to make the study and report upon what steps should be taken in regard to the improvement.

Mr. Hill is a former harbor engineer of the city. Mr. Pagon has made a specialty of aeronautical matters. Mr. Crozier preferred not to take part in the investigation on the ground that he would be reviewing work of his predecessor in office, Charles F. Goob.

Washington Traffic Survey to Cover Entire Year

A one-year survey of traffic on the principal highways in the area immediately adjacent to Washington, D. C., will be begun early in September by the U. S. Bureau of Public Roads in cooperation with the National Capital Park and Planning Commission; the District of Columbia; the State Roads Commission of Maryland; the State Highway Commission of Virginia; the Maryland National Capital Park and Planning Commission; the city of Alexandria; the counties of Arlington and Fairfax, Virginia; and the counties of Prince George and Montgomery, Maryland. The general purpose of the survey is to secure facts and obtain information which will enable the agencies concerned to develop a comprehensive, systematic and connected system of main highways. The surveys will be directed toward the development of a priority program of highway construction and betterment in the entire area and toward fixing the location and connections of suitable belt lines, relief roads, or necessary relocations and extensions of existing highways. They will include a highway traffic census to determine the origin and destination of various kinds of vehicles, the preparation of a comprehensive report and an analysis of the information obtained for the guidance of the officials concerned in the various jurisdictions.

Plan Proposed for Refinancing Merced Irrigation District

A refinancing plan submitted by the Merced Irrigation District (Calif.) Bond Holders' Protective Committee has been approved by the board of directors of the district. It has yet to receive the approval of the bond holders and the ratification of the taxpayers in the Merced Irrigation District before it will become effective. This Bond Holders' Protective Committee was appointed following the defaulting in the interest payment on bonds of the district (*ENR*, June 25, p. 1065). The immediate cause of the defaulting was a deficiency in the revenue from the by-product power caused by the water shortage.

The principle of the proposed plan, which is to extend over a five-year period, is to place the economic risk of decreased power revenue in drought years upon the bond holders instead of the taxpayers. The essential feature of the plan is a reduction in the minimum bond interest rate guaranteed by the district. This drops to zero for the year 1931-32, with a one per cent rate the following year, increasing on a sliding scale to 2½ per cent for the fifth year and thereafter resuming a 5½ and 6 per cent rate, according to the nature of the bonds. Additional interest to the bond holders during the five-year readjustment period will be possible only from excess power revenue. The $477,000 in bond interest due July 1 and

defaulted will be paid in full. The proposed reduction in bond interest will permit a reduction in tax rates of almost 50 per cent for the first year, with a gradual increase throughout the five-year period.

The plan provides for an operating expense fund of $100,000 to be taken from the first year's revenue. For the following four years definite amounts from the power revenue will be placed in a reserve fund until a $500,000 reserve fund has been established at the end of the five years. After this time $575,000 will be taken from the power revenue for operating expenses and then the power revenue will be used to pay off the retirement of the bonds.

The Nevada Irrigation District, which also failed to meet its July 1 bond interests, has been studying plans for the reorganization of that district. Again the drought caused a shortage in the revenue from power, making the income insufficient to pay the interest and principal on outstanding bonds.

Strike at Boulder Dam

(Continued from page 271)

would have been met in a few days by the normal progress of this part of the work. In fact, company officials point out the actual construction work was opened up before housing facilities had been completed because of the public demand to get the men to work.

About 700 men employed by subcontractors remain at work, as well as a small office force and several carpenters working at Boulder City. Just how long the suspension of activities will continue is uncertain; labor agencies at Las Vegas report a plentiful supply of men ready to take the places of the strikers.

There is a feeling in official quarters in Washington that the contractor has taken advantage of ill-advised action on the part of the workmen to close down the operations, because of the extreme heat. The federal government apparently will not intervene; it is taking steps, however, to protect its property. The contractor will not be penalized for the time lost because of the strike unless it can be shown that it was occasioned by some fault or negligence on his part. At present the work is nearly six months ahead of schedule.

Other developments on the job are as follows:

Water will be started through the new system at Boulder City during the week ending Aug. 15. Only 50 per cent of the backfill has been put in place pending the testing of the line. Pumping plant No. 2 is complete. A small amount of rock excavation remains to be done near the regulator tank and further extensions of the pipe line must be made. The concrete has been poured for the clarifier, and the installation of the machinery began Aug. 4. The machinery in pumping plant No. 1 has been set up and a sump tank has been completed. Work continues on the surge tank. Advertisements will be issued Aug. 15 for the water treating plant. Work on the water system has been delayed by the extreme heat.

The construction railroad down the canyon is 50 per cent complete. The railroad to the gravel pit is 30 per cent complete. A 4-in. airline is being laid from the compressor plant at the Arizona adit to the Arizona spillway site.

The first business permits issued at Boulder City went to an undertaker and to a motion picture operator.

Excavation for the administration and dormitory buildings in Boulder City are 70 per cent complete. The foundation for the west wing of the dormitory was poured Aug. 1. Advertisements will be issued Aug. 15 for the construction of the sewage disposal plant.

The Boulder City-Hoover Dam highway was completed July 31. Negotiations are in progress with Nevada authorities concerning the policy concerning taxes and schools.

The Business Outlook

Earning reports for the second quarter are not discouraging. European difficulties seem less menacing. These are the two cheerful things to be said of the most sluggish week of a sluggish summer. Automobile plants close down; building is curtailed sharply, foreshadowing dull days for steel makers. Cotton, wheat and copper prices move slowly down in lackadaisical trading. Declines in car loadings and bank debits also reflect the summer inertia. Though currency circulation has contracted somewhat, the level remains excessively high. The public is hoarding cash.

—The Business Week, Aug. 12.

Garden-Home Community Planned in Pittsburgh

Plans for the construction of a garden-home community in Pittsburgh are announced by the Buhl Foundation, a $13,000,000 philanthropic endowment. The site selected is 45 acres of wooded land on Mount Washington, within easy access of the business district. A community of 300 homes is planned at a cost of $2,000,000. It is expected that the first unit of 125 homes will be ready for occupancy by May 1, 1932.

By taking advantage of the present low level of material and construction costs it is expected that modern and desirable homes for junior executives and clerical workers can be built that at a moderate rental will provide a reasonable return on the investment.

Less than 30 per cent of the entire tract will be occupied with homes; the remainder will be landscaped to provide large central parks and wide lawns and gardens. The houses will be of five and six rooms, equipped with all modern conveniences.

Brief News

CONSTRUCTION of a reinforced-concrete causeway across Tabbs Bay, Tex., has been started. The structure will be 4,484 ft. long and will serve as the first link in a new highway through south Texas, bordering the Gulf coast.

SANTA MONICA, Calif., is planning a bond issue of $690,000 for the construction of a breakwater to convert a part of Santa Monica Bay into a lagoon for pleasure craft. The structure will be a 2,000 ft. concrete wall of the crib type.

ADDITIONAL CONTRACTS involving the construction of 594 miles of highway and 36 bridges, worth $4,993,982, have been awarded by the State Highway Commission of Texas.

KANSAS STATE REGISTRATION and Examining Board of Professional Engineers has been formed with R. A. Seaton, of Manhattan, as chairman; A. M. Meyers, Kansas City, vice-chairman; R. J. Paulette, Salina, secretary; G. C. Shaad, Lawrence, and Blair Boyle, Winfield, members. Applications for registration will be sent out at an early date.

ANOTHER STEP in the electrification program of the Pennsylvania Railroad between Washington and New York has been inaugurated. Work is to begin at once on the construction of a conduit system to carry signal, telegraph and telephone lines underground between Wilmington, Del., and Washington, D. C., through Baltimore. The total cost will be $7,000,000.

THE EHRENBURG TOLL BRIDGE, which crosses the Colorado River between California and Arizona at Blythe, Calif., is now operating as a free highway bridge. It was originally constructed by the California-Arizona Bridge Co., San Francisco, Calif., and operated as a private toll bridge. At the 1931 sessions of legislature in California and Arizona it was decided that the two states would jointly purchase the structure and operate it free.

JAMESTOWN, N. Y., has purchased that part of the electric plant of the Niagara, Lockport and Ontario Power Co. which serves Jamestown and the villages of Falconer, Celeron and part of Ellicott at a purchase price of $750,000. This step was taken to avoid duplication of service in competition with the municipally owned electric light plant. The sale has been approved by the New York State Public Service Commission.

PREPARATORY to constructing a $10,000,000 chemical-manufacturing plant on Nueces Bay, near Corpus Christi, Tex., the Southern Alkali Corp., of Barberton, Ohio, has contracted for an adequate supply of natural gas from near-by fields for fuel. A survey also has been made for the ship channel which it will construct from deep water at Corpus Christi to the site of the proposed plant, a distance of 2 miles. The depth of water in this channel will be sufficient to accommodate ocean ships.

Pioneer Railway To Be Abandoned

Abandonment of the greater part of the Honesdale branch of the Delaware & Hudson Railroad, the first in this country to be operated by steam, has been authorized by the Interstate Commerce Commission. It was on this line, constructed after the war of 1812, that the "Stourbridge Lion," the locomotive constructed by George Stephenson which is now in the Smithsonian Institute, was first placed in service on Aug. 8, 1829. The locomotive was used over a 10-mile level stretch, while stationary engines hauled the trains upgrade.

British Seek Uniform Code for Building Steelwork

An important conference, which it is hoped will have a permanent influence on the future of the British building industry by leading to the adoption of a standard practice in construction, is to be held at the Institution of Civil Engineers, London, in October. It has been convened by the state department of scientific and industrial research, which a year ago appointed the steel structures research committee, under the chairmanship of Sir Clement Hindley, to carry out an elaborate inquiry. The terms of its reference were: (1) to review present methods and regulations for the design of steel structures, including bridges; (2) to investigate the application of modern theory of structures to the design of steel structures, including bridges, and to make recommendations for the translation to practice of such of the results as would appear to lead to more efficient and economical design.

This committee has held a number of meetings. Under pressure from trade interests it has decided to issue a preliminary report which will summarize all the available technical information on the use of structural steel in building with a view to providing, if possible, a provisional basis for a standard practice throughout the country. In order to assemble all this information and to insure the practical application of the results of its work the committee considers it desirable to enlist at an early stage the interests and co-operation of all authorities likely to be concerned. The committee of the Privy Council for Scientific and Industrial Research indorses this view, and is accordingly inviting to the conference representatives of public bodies, professional and trade interests, and individuals who are in any way concerned in the design, erection, and use of steel-frame structures. Sir Clement Hindley will preside at the conference.

Although the conference is primarily concerned with British building practice, the dominions and colonies have been notified, through their London offices, that any representatives they may wish to send will be welcomed.

WASHINGTON NOTES

By PAUL WOOTON
Washington Correspondent

Road Building to Provide for Unemployed This Winter—I.C.C. Holds Up Mail Funds of R.F.&P.

THAT reliance again is to be placed on road building as one of the principal ways the federal government can create employment is indicated by the fact that the President had the chief of the Bureau of Public Roads as his weekend guest. By advancing $80,000,000 to the states last winter the federal government was able to expedite the road program to the point where nearly 400,000 men now are employed on road work. As three men are required to supply materials and equipment for each one actually engaged on the road, this activity accounts for the employment of more than a million men.

Last winter the Association of State Highway Officials recommended the appropriation of $250,000,000 as an emergency fund instead of $80,000,000. There is reason to believe that an amount larger than was appropriated last year will be recommended to Congress as an emergency road fund. It has been found that much work can be done in winter in the north. Materials can be made ready. Blasting can be done and cuts excavated. Seventy-five per cent of funds expended for road building is said to go to labor. Official announcement already has been made that increased amounts will be recommended for flood control and river and harbor work. Because of the unavoidable delays in getting building projects underway few additions to that program are expected. Advances on federal aid can be held back when times get better. This would help flatten out the peak.

All indications are that the administration will stand firmly against any use of federal funds for charity. Federal money was not used in Cleveland's administration when conditions were worse. If Congress should insist on such a plan a compromise may result under which the federal government would match any funds for the purpose voted by a state.

SOCIETY CALENDAR

AMERICAN ASSOCIATION OF ENGINEERS, Chicago; annual convention, Huntington, W. Va., Sept. 28-30.

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, Washington; annual meeting, Sept. 28-Oct. 1, Salt Lake City.

AMERICAN PUBLIC HEALTH ASSOCIATION, New York; annual convention, Montreal, Sept. 14-17.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; fall meeting, St. Paul, Minn., Oct. 7-9.

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS, St. Louis; meeting, Oct. 19-26, Pittsburgh.

AMERICAN WELDING SOCIETY, New York City; fall meeting, Sept. 21-25, Boston.

INTERNATIONAL CITY MANAGERS ASSOCIATION, Chicago; annual meeting, Oct. 7-10, Louisville, Ky.

INTERNATIONAL ASSOCIATION OF PUBLIC WORKS OFFICIALS, Chicago; conference, Sept. 24-26, New York City.

NATIONAL MUNICIPAL LEAGUE, New York City; annual meeting, Nov. 9-11, Buffalo, N. Y.

NATIONAL SAFETY COUNCIL, New York City; twentieth annual safety congress, Chicago, Oct. 12-16.

NEW ENGLAND WATER WORKS ASSOCIATION, Boston; annual convention, Sept. 29-Oct. 2, Boston.

MISSOURI WATER AND SEWERAGE CONFERENCE will hold its seventh annual meeting Oct. 22 and 23 at Jefferson City. Herbert Bosch, State Board of Health, Jefferson City, is secretary.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS will hold its annual convention at Richmond, Va., Oct. 20-23.

PACIFIC COAST BUILDING OFFICIALS CONFERENCE will meet Oct. 5-10 at Berkeley, Calif. The subjects of building code development and enforcement will be stressed in the discussions.

WISCONSIN SECTION, A.W.W.A., will celebrate its tenth anniversary at a meeting, Oct. 26-27 at Racine. L. A. Smith, Madison, is secretary.

Engineers Plan for Unemployment Relief

A program for mobilizing engineers throughout the country in the fight on unemployment has been submitted by American Engineering Council to its member societies. Much emphasis is placed upon the opportunity that engineers have to carry through sound measures for providing and maintaining employment. The program is designed essentially for local application but it is hoped that, with the cooperation of all engineers, the net results will be national in effect. Alternate plans are suggested for the use of engineers working through local units. Drafted by a committee of which F. J. Chesterman, vice-president of the Pennsylvania Bell Telephone Co. is chairman, the report has been approved by council's executive committee and will be made public in the near future.

Barge Service Maintained Despite Low Water

Despite the fact that the Mississippi River fell to unprecedentedly low stages during July, no operating difficulty was experienced by the government barge service. This was stated recently by officials of the Inland Waterways Corporation. As a contrast to this achievement, it is pointed out that losses totaling more than $50,000 were caused by low water during July, 1930, although the water was not as low last year as it is now. The most difficult section of the river in which to maintain a channel is between St. Louis and Cairo. Weather Bureau records show that the water in this section is nearly a foot lower than it was last year.

The ability of the barge line to operate during extreme low water stages is attributed largely to the program worked out by the war department for coordinating dredging operation with navigation movements. When it appears that navigation is likely to be hampered

by low water, dredges are sent immediately to the vicinity of bars and bends where the channel is constructed. To provide additional dredges for this work, instructions were sent from the war department on July 30 authorizing leasing of four large dredges from private contractors. As a further aid to navigation, the army engineers have increased their channel marking activities.

Permanent Highway Records

As the result of the recent Paris meeting of the Permanent Committee of the International Association of Road Congresses it was decided to request the various countries to set up central committees for the purpose of carrying on some of the regular work. One of the functions of these central committees would be to compile bibliological information on technical literature for an international library to be maintained at the Permanent Association in Paris. The Permanent Committee voted at its recent meeting to establish such a library.

The United States was represented at the meeting by H. S. Fairbank, chief of the information division of the Bureau of Public Roads, and William Finger, automotive trade commissioner of the Commerce Department. German delegates informed the central committee that they are formulating their plans for the seventh International Road Congress to be held in Munich in 1934.

Forced Collection of Excess Railway Profits Inaugurated

Some twenty-four million dollars is at stake in the Interstate Commerce Commission's attempt to collect from railroads one-half of their earnings over 6 per cent in good years gone by. To avoid a test on the method used in establishing the valuation of railroad property for computing the roads' recapturable earnings, the I.C.C. has arranged with the comptroller general to withhold pay due the Richmond, Fredericksburg & Potomac Railway from the Post Office Department for carrying the mails. This amounted to $388,325 last year. In its first final order in a recapture case, the commission demanded that the R. F. & P. pay into the U. S. Treasury, by August 7, $696,705 as excess earnings accrued in 1922 and 1923. The R. F. & P. and 78 other roads dispute the summary process used by the commission in determining their excess income.

Recognized both by the commission and the railroads as a test case, the R. F. & P. has been trying to jockey the commission into a position where it will have to justify a method of valuation that purports, in conformity with the U. S. Supreme Court's decision in the O'Fallon case, to give some weight to reproduction cost. The railroads claim that the Commission is still intent on deflating their proper valuation but its strategy in appropriating the R. F. & P. mail's pay as it becomes due, thrusts on the railroad the burden of proving that the commission's formula on valuation is wrong.

Personal Notes

CONSOLIDATION of the engineering organization of Symonds and Stevens with X. Henry Goodnough, Inc., has been announced. Members of the firm are X. Henry Goodnough, Fred O. Stevens and Bayard F. Snow; offices are at 14 Beacon St., Boston, Mass.

RAY E. MACKENZIE has been transferred from the Baltimore district, U. S. Engineer Department, to the Upper Mississippi Valley Division at St. Louis, where he will be engaged in hydraulic investigations. Mr. Mackenzie was formerly with the Bureau of Reclamation, Aluminum Co. of America and the Huntington, W. Va., Engineer district.

H. WESLEY CLARK has been appointed city engineer of Niagara Falls, N. Y., to succeed the late Pascal D. Dietrick, who succumbed to injuries sustained in an automobile accident. At the same time, H. J. Curts was promoted from first assistant to deputy; C. W. Collison was named first assistant engineer and H. J. Green was appointed second assistant engineer.

ARTHUR R. WELLWOOD has been appointed chief engineer of the newly-created Power Rate Investigating Committee of South Carolina, which is to make a thorough study of the rates charged for electric current throughout the state and report in January, 1932. During the construction of the Saluda hydro-electric project Mr. Wellwood was resident engineer for Murray & Flood, consulting engineers.

ELLSWORTH L. FILBY, chief engineer and director of the bureau of engineering of the Florida State Board of Health, has resigned to become associated with Black & Veatch, consulting engineers of Kansas City, Mo. Mr. Filby was one of the organizers of the Florida section, American Water Works Association, and of the Conference of State Sanitary Engineers. He is also a member of the American Society of Civil Engineers and of the American Public Health Association.

Obituary

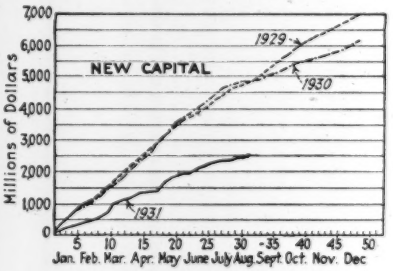
J. C. MCCRUM, 56, hydrographic engineer of Portland, Ore., died July 25 while engaged on a survey of Temperance Creek in an isolated section of eastern Oregon. Mr. McCrum had just finished swimming in Snake river when he was stricken with a heart attack.

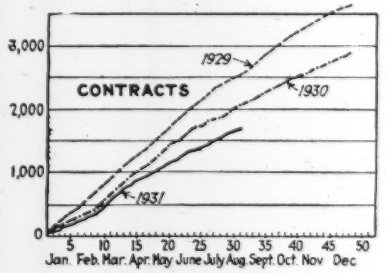
ELMER JOHNSON, senior engineer in the Bureau of Agricultural Engineering of the U. S. Department of Agriculture, was found dead in his apartment at Washington, D. C., on July 28.

THOMAS ROGERS HUGHES, 29, a civil engineer doing appraisal work for the American Waterworks and Electric Co. at St. Joseph, Mo., died in that city Aug. 2 of paralysis. He was a graduate of Miami University, Oxford, Ohio, and of the Massachusetts Institute of Technology, and was a son of Dr. Raymond M. Hughes, president of Iowa State College.

Capital and Contracts

New capital issued during the week of Aug. 8 totaled but 9 million dollars, of which 4 were corporate and 5 state or municipal. The week's total was extremely small compared with 44 millions for the preceding week, a weekly average of 61 millions in July, and 25 millions in August, 1930.





Included in the principal issues of the week were: State of California 4s, $1,753,000, for state parks; Los Angeles 4¼s, $1,800,000, schools; Fruit Growers' Express Co. 4s, $1,000,000, refrigerator cars.

Cumulatively, new capital for construction has reached 2,547 millions thus far this year, compared with 4,814 for the corresponding period of 1930.

COSTS AND CONTRACTS

ENR Index Numbers

Cost			Volume		
Aug. 1, 1931	**168.38**	**July, 1931**	**277**
July 1, 1931	174.37	June, 1931	243
Aug. 1, 1930	200.95	July, 1930	226
Average, 1930	202.85	Average, 1930	260
Average, 1929	207.02	Average, 1929	317
1913	100.00	1913	100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Aug. 13, with some comparisons, total as follows:

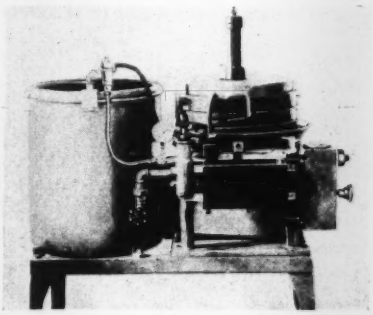
(In Thousands of Dollars)

	Aug. 13, 1931	Average of Last Four Weeks 1931	1930
Buildings:			
Industrial	$4,629	$8,726	$7,717
Other	12,269	13,524	21,207
Streets and roads.	10,731	9,625	13,046
Other construction.	15,127	18,119	18,937
Total	$42,756	$49,995	$60,907
Total, all classes, Jan. 1 to Aug. 13:			
1931		$1,736,979	
1930		2,271,900	

Construction Equipment and Materials

Electrolytic Chlorinator for Small Water Supplies

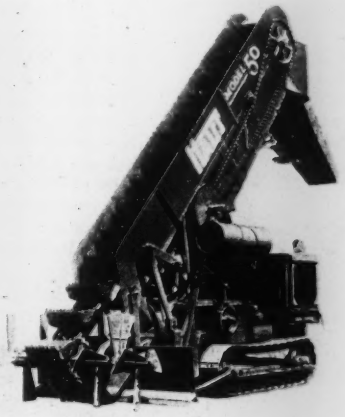
Designed for the protection of small water supplies and swimming pools, especially those on private estates and summer camps, a new electrolytic chlorinator recently announced by the Wallace & Tiernan Co., Inc., Newark, N. J., can be operated by persons entirely unfamiliar with the technicalities of chlorination. The apparatus generates chlorine gas from a saturated brine solution, mixes the gas thoroughly with the correct proportion of water and delivers uniform chlorination at the point of application. The rate of gas generation is controlled by simply turning a rheostat, and is automatically stopped should the water supply be accidentally cut off. Electric current consumption is the equivalent of one 150-watt bulb; power can be obtained from the standard lighting circuit or, where this is not available, from dry cells or storage batteries.



Electrically operated chlorinator

Loader for Stockpile Use

In the belief that there are many stockpile loading jobs which do not require the full power and capacity of larger bucket loaders, the George Haiss Mfg. Co., Inc., 391 Canal Place, New York City, has designed a loader especially for average stockpile requirements which can be sold at a moderate cost. Despite its low price, the Haiss model 50 is built to the same standards of strength, precision and quality used in the larger machines of this company. It has a capacity of 1½ to 1¾ cu.yd. per minute handling materials weighing not more than 125 lb. per cubic foot with a lump size not larger than 6 in. The machine is driven by a 37-hp. four-cylinder gasoline motor equipped with air cleaner, oil filter, gasoline strainer and inbuilt governor. It has an inclosed roller and ball bearing transmission, with all gears and clutches running in oil, and patented manganese steel



Portable bucket loader

feeding propellers. The truss-type boom is balanced on a pivot shaft and raised or lowered by a hand wheel which operates worm gear and jackknife levers. The boom is self-locking in any position. High side guards and head inclosures minimize spillage; there is also a spillage pan to return material to the loading point. Bucket size is 12x18 in., material seamless forged steel. The net weight of the loader is 13,600 lb.

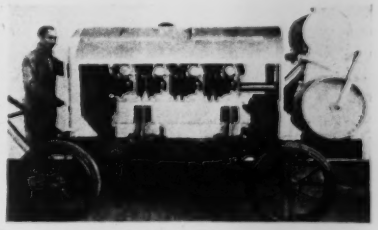
Digging Power a Feature of New Clamshell Bucket

Many improvements applied to the Champion clamshell bucket, in combination with the original lever arm principle providing straight cable leads, have enabled the G. H. Williams Co., Erie, Pa., to guarantee definitely increased digging power on any material handling or excavating work. The use of extended corner brackets projecting well beyond the back of the scoop gives additional closing leverage in the new bucket. A narrower head, of cast steel, provides rigid resistance to the twisting strains in hard digging. Extra-long roller guards of a new type and a large transverse roller protect the cable in all directions. Each corner pin has a T-head that fits into a slot in the corner bracket, preventing turning as the bucket opens and closes and minimizes wear on the corner bar bushings. These features, in addition to giving unusual digging results, are said to result in important savings in cable costs and reduced bucket maintenance.

Improved clamshell bucket

360-Ft. Air Compressor Unit

Light weight is the outstanding feature of a new four-cylinder 320-cu.ft. portable air compressor unit announced by the Davey Compressor Co., Canton, Ohio. Mounted on a rubber-tired trailer, as illustrated, this unit weighs only 4,800 lb.; with skid mounting, only 4,400 lb. Most of the weight elimination is due to the air-cooling principle and the simplified construction resulting therefrom. Dividing the compressor load over four cylinders instead of two provides smoother operation with less wear and tear on compressor and engine. The compressor crankshaft is balanced and counterweighted and runs in five large bronze-backed bearings. Full-pressure lubrication, even to the wrist pins, with efficient air cleaners and oil filters, insures a constant supply of clean oil to all working parts.



Portable air cooled compressor unit

Connection between the compressor and the driving engine is through a V-belt and clutch which can be disconnected while starting the motor. A special mounting is also available for the Caterpillar 60 tractor, in which the compressor unit is driven through V-belts and clutch by the tractor motor.

Manganese Electrode Utilizes Shielded Arc Process

An electrode which utilizes the shielded arc process to build up worn manganese steel castings has been developed by the Lincoln Electric Co., Cleveland, Ohio. The new product, known as Manganweld, not only simplifies welding procedure but also produces a weld with the structure and qualities of wear-resisting cast man-

(Continued on page 280)

Current Construction Unit Prices

Sixth St. Viaduct Over Los Angeles River

SIXTH ST. Viaduct across the Los Angeles River and the Santa Fe and Union Pacific railroad tracks, including the improvement of Sixth St. where it is in cut east of the viaduct, is 4,300 ft. long. The viaduct itself is 3,600 ft. long and has a maximum overall width of 73½ ft. Roadway width varies from 56 ft. at the end, where traffic will be held up by signals, to 46 ft. along the center portion. The viaduct consists of reinforced-concrete girder spans on each side of the 300-ft. Los Angeles River channel. The river crossing is effected by a two-span semi-through continuous unsymmetrical steel arch system with a tie from end to end at roadway level. The contract awarded includes the following:

(a) All reinforced-concrete and structural steel work on the viaduct and approaches.
(b) Fills for the approaches and the viaduct.
(c) Curbs, gutters, sidewalks
(d) Ornamental railings, pylons, and lighting system.
(e) Storm drains.
(f) Sanitary sewers.
(g) Pavements.
(h) All other labor, materials, tools necessary to complete the work, except electric wiring, incandescent lamps and dome refractors for the lighting units, which are furnished by the city.

Bids were asked on four alternates: (1) Work complete, as outlined in the accompanying tabulation of unit prices; (2) fabrication and delivery of structural steel; (3) erection of structural steel; (4) work complete exclusive of fabrication, delivery and erection of structural steel. Contracts were awarded in May, 1931, on alternate 4 (exclusive of steel work) to J. F. Knapp, 5301 Horton St., Oakland, for $1,275,525; on alternate 2 (fabrication and delivery of steel) to the Virginia Bridge & Iron Co., Los Angeles, $112,330; and on alternate 3 (erection of steel) to Allen Bros., Inc., Los Angeles, $35,368. Thus the total price for the bridge is $1,420,223.

Class F concrete is 1:2:3 mix; class G is 1:4:8. Handrail, ornamental pylons and lighting standards are constructed of class H concrete of 1:2½:2½ mix.

Time allowed for the steel work is 180 days for fabrication and delivery; 270 days for erection. The contractor for the remainder of the structure is to complete the east and west river piers and the center river pier up to the skewback of the arches in 120 days, and is to complete his contract in 550 days.

Unit prices are given in the table of the lowest three bidders on alternate 1. A lump sum price was asked for the 4,210 tons of steel reinforcing. This does not include steel in handrail or pylons, except dowels projecting from the decks, and does not include steel in concrete piles. Item 2, for class F concrete, does not include the piles but does include forms, falsework, excavation and backfilling. The lump sum for reinforced-concrete piles in place is based on 15-ft. lengths. Item 7 for curbs does not include curb on the concrete deck or curb built as an integral part of the structure, which is paid for as concrete.

Prices are given for schedules 1, 2 and 3. Those for alternate 4 are not given because the items and prices are identical with those of alternate 1, except for the omission of the steel prices.

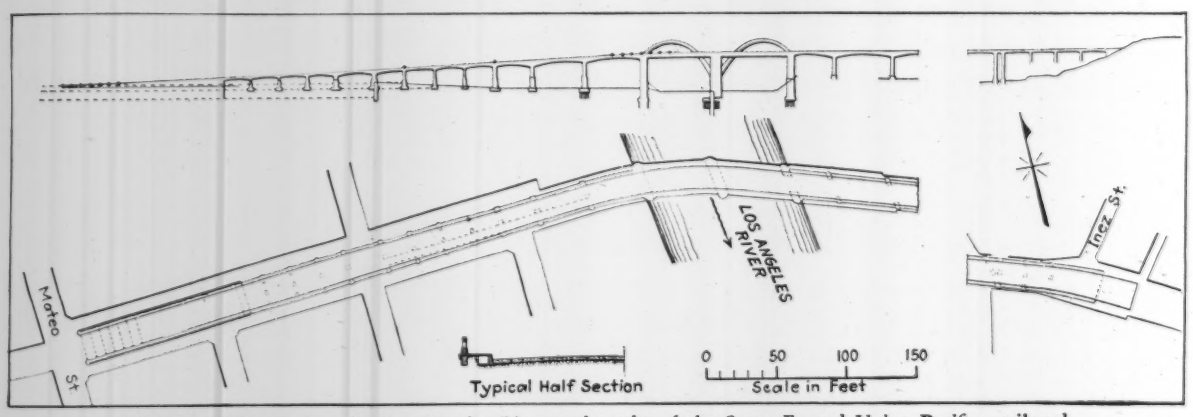
Eight bids were received on alternate 1, and unit prices are given of the lowest three: A, J. S. Knapp, contract: B, H. W. Rohl Co., $1,537,510; C, Bent Bros., $1,545,155 using precast piles and $1,543,615 using piles cast in place. The fourth bid, by Merritt, Chapman & Scott, was $1,546,611 using precast, or only $1,456 more than the corresponding bid by Bent Bros. The sum of the eight bids using precast piles and piles cast in place are respectively $13,083,000 and $13,089,000. J. J. Jessup is city engineer, Merrill Butler is engineer of bridges and structures, and H. P. Cortelyou is engineer of construction.

	A	B	C
1. 4,210 tons reinf. steel in place, lump.	$302,000.00	$300,000.00	$310,000.00
2. 47,300 cu.yd. class F concrete	16.00	18.50	19.00
3. 500 cu.yd. class G concrete	7.50	10.00	9.80
4. Reinf.-conc. piles in place, precast	15,000.00	15,000.00	15,000.00
5. Reinf.-conc. cast in place	15,000.00	15,000.00	14,000.00
6. Structural steel in place, lump	205,000.00	165,000.00	150,000.00
7. Grading, lump	7,000.00	6,000.00	2,500.00
8. 2,900 ft. cement curb	.75	1.00	.85
9. 23,000 sq.ft. conc. gutter	.25	.10	.15
10. 35,500 sq.ft. cement sidewalk	.10	.12	.20
11. Sanitary sewers, lump	6,000.00	2,500.00	4,000.00
12. Storm sewers, lump	5,000.00	4,500.00	4,500.00
13. Pavements, lump	29,000.00	30,000.00	29,000.00
14. Handrail and pylons, lump	52,500.00	45,000.00	49,500.00
15. Lighting, lump	84,000.00	80,000.00	63,500.00
Totals, alternate 1, pre-cast	$1,477,525	$1,537,510	$1,545,155
cast in place	1,477,525	1,537,510	1,543,615

Totals, alternate 2	
Virginia Bridge & Iron Co	$112,330
Consolidated Steel Co	130,800
Minneapolis Moline Power Implement Co	144,700
Totals, alternate 3	
Allen Bros	$35,368
F. L. Holser & Co	39,000
Consolidare Steel Co	48,900

Dredging in South Jersey

BIDS were received June, 15 by the New Jersey State Board of Commerce and Navigation for dredging an inland waterway channel in Cape May County. Seven bids were received ranging from 13.75c. to 21.4c. for six, and 37.5c. for the seventh. Contract was awarded to the low bidder, Hill Dredging Corp., 5601 Atlantic Ave., Ventnor City, N. J.



Sixth St. viaduct across the Los Angeles River and tracks of the Santa Fe and Union Pacific railroads

Current Construction Unit Prices

Costs of Municipal and Waterworks Construction, Birmingham, Ala.

COMPARATIVE costs of water, paving and sewer construction in the city of Birmingham, Ala., during the three years 1929, 1930 and 1931 are given in tabular form. Due to the necessity of following municipal standards it is not possible to compare all forms of structures for all three years. The figures, however, give a fair indication of the cost of such construction, during the period covered, in accordance with customary municipal and private waterworks standards.

CAST IRON WATER MAINS IN PLACE

Size	Cost per Lin. Ft. 1929	1930	1931
2-in. galvanized	$0.35–0.45	$0.33–0.43	$0.32–0.42
2-in. cement-lined	.38– .50	.36– .48	.35– .46
4-in	.75– .90	.73– .88	.69– .83
6-in	1.00–1.15	.98–1.13	.92–1.06
8-in	1.25–1.40	1.23–1.38	1.15–1.29
10-in	1.60–1.80	1.57–1.78	1.48–1.66
12-in	2.10–2.40	2.06–2.36	1.94–2.21

STREET PAVING

Type	Cost per Square Yard 1929	1930	1931
Warbilt	$1.71	$1.66	$1.58
Sheet asphalt	1.76	1.64	1.62
Asphaltic concrete	1.42*	1.46*	1.32

* 5-in. base; all others 6 in.

SANITARY SEWERS

Type	Cut	Price
1929		
8-in. concrete	0–6	$0.54
8-in. concrete	0–6	$0.54
8-in. concrete	6–8	.69
8-in. concrete	8–10	.89
8-in. concrete	10–12	1.25
8-in. concrete	12–14	1.50
8-in. concrete	14–16	1.80
1930		
8-in. terracotta	0–6	$0.54
8-in. terracotta	6–8	.64
8-in. terracotta	8–10	.80
8-in. terracotta	10–12	1.00
8-in. terracotta	12–14	1.40
8-in. terracotta	14–16	1.90
1931		
36-in. one-ring brick	0–6	3.25
30-in. one-ring brick	0–6	2.80
21-in. terra cotta	0–6	1.90
18-in. terra cotta	0–6	1.40
15-in. terra cotta	0–6	1.20

STORM SEWERS

Type	Cut	Price
1929		
75-in. concrete	Excavation separate	$9.70
69-in. concrete	Excavation separate	8.65
66-in. concrete	Excavation separate	8.20
63-in. concrete	Excavation separate	7.50
60-in. concrete	Excavation separate	7.10
57-in. concrete	Excavation separate	6.65
54-in. concrete	Excavation separate	6.20
48-in. concrete	Excavation separate	5.35
45-in. concrete	Excavation separate	5.10
42-in. concrete	Excavation separate	4.70
39-in. concrete	Excavation separate	4.05
36-in. concrete	0–6	3.95
36-in. concrete	6–8	4.15
36-in. concrete	8–10	4.55
36-in. concrete	10–12	5.00
36-in. concrete	12–14	6.00
33-in. concrete	0–6	3.25
33-in. concrete	6–8	3.55
33-in. concrete	8–10	4.00
33-in. concrete	11–12	4.75
30-in. concrete	0–6	3.10
30-in. concrete	6–8	3.55
30-in. concrete	8–10	3.00
24-in. terra cotta	0–6	2.85
24-in. terra cotta	6–8	3.10
24-in. terra cotta	8–10	3.50
24-in. terra cotta	10–12	3.95
24-in. terra cotta	12–14	5.00
18-in. terra cotta	0–6	1.60
18-in. terra cotta	6–8	1.85
15-in. terra cotta	0–6	1.30
15-in. terra cotta	6–8	1.45
15-in. terra cotta	8–10	1.80
12-in. terra cotta	0–6	1.40
12-in. terra cotta	6–8	1.70
12-in. terra cotta	8–10	1.90
10-in. terra cotta	0–6	1.15
10-in. terra cotta	6–8	1.25
10-in. terra cotta	8–10	1.45
8-in. terra cotta	0–6	.90
8-in. terra cotta	6–8	1.00
8-in. terra cotta	8–10	1.20
6-in. terra cotta	0–6	.70
1930		
60-in. two-ring brick	Excavation separate	$5.55
48-in. two-ring brick	Excavation separate	4.90
42-in. two-ring brick	Excavation separate	4.40
36-in. one-ring brick	0–6	2.45
21-in. terra cotta	0–6	1.29
15-in. terra cotta	0–6	.72
18-in. terra cotta	0–6	1.00
1931		
45-in. two-ring brick	Excavation separate	$4.71
42-in. two-ring brick	Excavation separate	4.41
36-in. one-ring brick	0–6	2.63
33-in. one-ring brick	0–6	2.33
30-in. one-ring brick	0–6	2.10
27-in. one-ring brick	0–6	2.00
24-in. one-ring brick	0–6	1.90
18-in. triple strength terra cotta	0–6	1.60
15-in. triple strength terra cotta	0–6	1.30
12-in. triple strength terra cotta	0–6	1.20
10-in. triple strength terra cotta	0–6	.88
8-in. triple strength terra cotta	0–6	.69
6-in. triple strength terra cotta	0–6	.60
4-in. triple strength terra cotta	0–6	.45

New Administration Building for Bergen County, N. J.

BIDS were received July 3, 1931, for a four-story and basement administration building for Bergen County, N. J., to be located in Hackensack. Materials are to be brick, steel and reinforced concrete. Low bids and average bids are given herewith for the general contract and for the five subcontracts. Bidders numbered nine on the general contract, six on steel, five on plumbing, nine on heating, five on electrical work, and three on elevators.

The structure is of the conventional type, and gives a good indication of building costs in this section of the country.

	Low Bids	Per Cent of Total	Average Bids	Per Cent of Total
General	$697,880	73.8	$738,000	73.0
Steel	52,987	5.6	60,200	6.0
Plumbing	24,900	2.7	30,300	3.0
Heating	21,047	2.2	24,300	2.4
Electrical	98,730	10.4	103,600	10.4
Elevators	49,965	5.3	52,600	5.2
	$945,509	100.0	$1,009,000	100.0

Pipe Laying Costs in Duluth, Minn.

COMPARATIVE costs of water and gas main construction in Duluth, Minn., during the years 1929, 1930 and 1931 are given in the following table:

Size of Pipe	Total Footage	Average Cost of Pipe, Per Foot	Laying, Per Foot	Earth, Per Yard	Rock, Per Yard	Per Cent Rock	Average Cost Per Foot In Place
1929							
6-in. Water and 4-in. Gas	3,424	$1.37	$0.37	$1.16	$2.27	1	$3.32
4-in. Gas	993	.52	.17	.86	...	...	1.43
10-in Water	1,060	2.02	.50	2.25	...	...	5.54
12-in Gas	1,113	2.02	.25	1.30	3.00	12	5.41
16-in Gas	12,369	2.96	.33	1.41	7.09	16	6.34
1930							
6-in Water and 4-in Gas	2,432	$1.36	$0.37	$1.75	$11.79	9	$4.27
4-in Gas	114	.52	.25	1.10	...	...	2.12
10-in Water	785	1.57	.25	1.00	...	...	3.24
12-in Gas	7,178	1.90	.23	1.26	6.81	6	4.05
16-in Water	498	2.95	.50	1.41	...	...	4.45
1931							
6-in Water and 4-in Gas	2,580	$1.35	$0.31	$1.50	$6.50	1	$3.30
4-in Gas	164	.54	.15	1.00	...	...	1.98
10-in Water	2,772	1.37	.15	1.65	5.00	30	4.43
12-in Water	448	1.83	.20	1.60	...	...	5.71
16-in Water	936	2.95	.20	1.50	10.00	38	11.64

Manganese Electrode

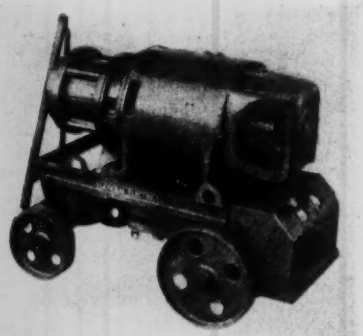
(Continued from page 277)

ganese steel. It contains from 11 to 15 per cent manganese, this giving an air toughening weld which eliminates the necessity of quenching the bead. A heavy extruded coating provides a shielded arc, allowing the transfer of metal to take place under non-oxidizing conditions. This coating also insures a minimum of arc disturbance and boiling in the crater and provides a layer of easily removable slag which further protects the weld from the harmful effects of the air.

Manganweld causes the weld to remain in the austenitic state even on slow cooling. Water quenching, which sets up localized strains often resulting in checks and unsatisfactory welds, is thereby avoided. Laboratory experiments show that the weld material deposited has a Rockwell C hardness of 5 to 10; and after cold working attains a Rockwell C hardness of 45 to 50. Electrodes are used with reversed polarity, and are manufactured in $\frac{1}{8}$-, $\frac{5}{32}$-, $\frac{3}{16}$- and $\frac{1}{4}$-in. sizes of the standard 14-in. lengths.

Single-Operator Welding Sets

Many improvements over past designs are included in a new line of single-operator welding sets with ratings



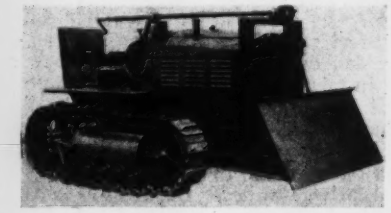
Portable arc welding set

of 100, 200, 300, 400 and 600 amp. which has just been announced by the General Electric Co., Schenectady, N. Y. The line includes both portable and stationary sets for operation on either alternating or direct current at all standard voltages. Two and three-phase gasoline-engine-driven sets will also be available.

Principal features of the new line include the use of two-bearing construction on the a. c. types up to 600 amp., compactness and light weight, and greatly improved welding characteristics. The sets are self-excited with a tapped series field for major current adjustments and a shunt field rheostat giving duplex voltage control. The typical a.c. set consists of a generator with an overhung driving motor mounted on a single base to which is attached a sheet-metal control cabinet enclosing the generator control devices, meters and motor starting equipment.

Bulldozer for Light Tractor

Light dirt-moving operations can be served effectively by the Hall mechanical lift bulldozer attachment for Cletrac 15 tractors which is manufactured by the Essex Tractor Co., 448 Washington Ave., Belleville, N. J. The blade of

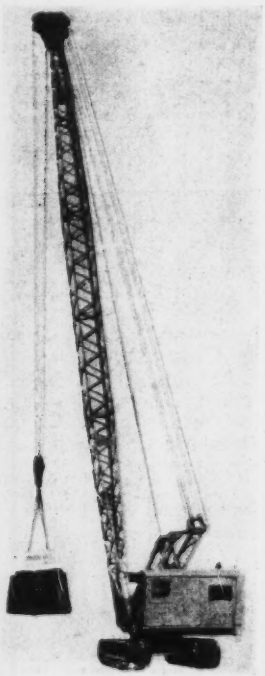


Small bulldozer attachment

this bulldozer is so mounted that the thrust resulting from its operation passes close to the center of gravity of the tractor. Rotation or slewing under load is minimized, and steering into the load practically eliminated. Blade dimensions are 53x24 in., with a thickness of $\frac{1}{4}$ in.

Special Boom for Crawler Crane

What is believed to be the first application of the hammerhead type of boom to a crane of the crawler type is now available for attachment to machines produced by the Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill., for steel erection purposes. This type of boom, which is designed to keep the load away from the boom structure, is provided with sheaves for a five-part line. The machine illustrated is capable of handling a load of 28,000 lb. at a radius of 13 ft.



Hammerhead crane boom

New Publications

Tractors — Applications of tractors to grading, ditching, handling rails, ballasting, mowing right-of-way and other railway work are illustrated in a 28-p. pamphlet of the CATERPILLAR TRACTOR Co., Peoria, Ill.

Vacuum Pumps—A comprehensive explanation of the way in which a vacuum is produced by a pump, illustrated by a sectional drawing in four colors, is a feature of the new 28-p. bulletin 137 on the Condo-Vac return line vacuum and boiler feed pump which has been issued by the CHICAGO PUMP Co., 2336 Wolfram St., Chicago, Ill.

Road Machinery—A pocket-size booklet containing illustrations and brief descriptions of the various types of road machinery which it produces may be obtained from the J. D. ADAMS Co., 217 South Belmont Ave., Indianapolis, Ind.

Motor Bearings—Reasons for its specialization on steel-backed babbitt-lined bearings for electric motors are given by the WAGNER ELECTRIC CORP., 6400 Plymouth Ave., St. Louis, Mo., in a 4-p. bulletin "Steel-Backed Babbitt-Lined Bearings."

Metal Cribbing—An 8-p. illustrated pamphlet describing the metal cribbing developed by the American Rolling Mill Co., can be secured from the ARMCO CULVERT MANUFACTURERS ASSOCIATION, Middletown, Ohio. The new type of cribbing was described in *ENR* for May 7, 1931, p. 783.

Waterworks Advertising—A series of 26 alphabetical advertisements of the semi-humorous type prepared by the department of information of the American Water Works & Electric Co., for use in the newspaper advertising of its subsidiary waterworks companies is reproduced in a booklet "When You Drink That, Smile", which may be obtained from the AMERICAN WATER WORKS & ELECTRIC Co., INC., 50 Broad St., New York City.

Business Notes

REPUBLIC STEEL CORP., Youngstown, Ohio, has promoted L. S. Hamaker, advertising manager, to the post of manager of sales promotion.

HEADLEY EMULSIFIED PRODUCTS Co., Philadelphia, Pa., has appointed J. G. Campazzie as vice-president, directing sales.

A. M. BYERS Co., Pittsburgh, Pa., has taken a six months' option to purchase the Canonsburg Steel & Iron Works, Canonsburg, Pa., which has an annual capacity of 38,000 tons of black sheets and 16,000 tons of galvanized sheets. These facilities, it is understood, will be used experimentally in the production of wrought iron sheets.

OHIO COLPROVIA Co. 406 Marion Building, Cleveland, Ohio, has acquired a license to manufacture and distribute Colprovia for the entire state of Ohio. The company's first plant, with a capacity of 750 tons daily, will be located at Sandusky, Ohio. Colprovia is a product which contains no volatile materials, liquefying agents or cutbacks, and is not an emulsion. It makes possible a completely cold process for manufacturing, shipping and laying asphaltic pavements of five different types.

CLEVELAND TRACTOR Co., Cleveland, Ohio, has appointed three district sales managers to take over the duties of the late C. D. Fleming, vice-president and director of domestic sales. W. E. Miles controls all territory east of a line running from Chicago to New Orleans; H. E. Orr the territory west of a line connecting the eastern boundary of Montana with the eastern boundary of New Mexico; and G. W. Pickering the intervening territory. Mr. Pickering will also be in charge of Cletrac sales in Canada, and Mr. Orr will continue as advertising manager.

WESTINGHOUSE ELECTRIC & MFG. Co., East Pittsburgh, Pa., has announced the following appointments in its sales organization: T. J. Pace, assistant to vice-president, in charge of general market planning and research analysis; M. B. Lambert, sales manager in charge of transportation department; O. F. Stroman, sales manager in charge of industrial department; R. A. Neal, sales manager in charge of central station department; T. R. Langan, northeastern district manager, with headquarters in New York City.

J. T. VINSON, recently transferred by the Columbian Iron Works from Chattanooga to be its southwestern sales manager at Dallas, Tex., was drowned while surf bathing at Galveston on July 9.

CONSTRUCTION NEWS

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Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	*Project*	*Cost*	*Status*
Waterworks			
Salem (Ore.)	Waterworks system	$1,375,000 to 2,500,000	Proposed
Jamestown (Pa.)	Dam, reservoir, etc	1,500,000	Bids asked
Hamilton (Ont.)	Filtration plant	1,000,000	Bids asked
Bridges			
Pittsburgh (Pa.)	Bridge approach, etc	1,070,000	Bids asked
Unclassified			
Newark (N. J.)	Terminal development	3,500,000	Proposed
Federal Government			
Ft. Worth	Federal building	1,215,000	Proposed
Seattle	Federal building	1,294,000	Contract
Shops and Foundries			
Montreal, Que	Foundry and steel plant	2,000,000	Proposed
Power Plant			
Vernon (Calif.)	Power plant	1,600,000	Contract
Buildings			
Boston	Profession arts superstructure	4,000,000	Contract
Newark (N. J.)	High school	1,080,000	Bids asked
Indianapolis	War Memorial	1,045,000	Bids asked
St. Louis	Station and office	1,500,000	Proposed
Cincinnati	Newspaper	1,800,000	Contract

WATERWORKS

PROPOSED WORK

Calif., Bieber—Surveys water system and sewage disposal plant. Improvement district will be formed to finance. Est. exceeds $25,000. S. A. Mushen, Alturas, engr.

Calif., Santa Cruz—City rejected bids drilling wells, installing pumping equipment for water plant.

Ill., Colchester—City Council soon takes bids 75,000 gal. tank on tower, brick pump house, 50,000 gal. concrete clear well, 2 centrifugal pumps, chlorinator. W. A. Fuller Co., 2916 Shenandoah Ave., St. Louis, Mo., engrs. Noted Nov. 27.

Mo., Waynesville — City, bids soon waterworks system. $21,000 bonds voted. J. D. Hamel, Nealey Bldg., Springfield, engr. Noted Aug. 6.

N. J., Manville—Bd. Boro Council, Boro Hall, will not build municipal chlorinating plant, $25,000. Project abandoned. Noted Jan. 22.

N. J., Orange—Bd. City Comrs., City Hall, municipal water pumping and electric light plant, $425,000. **Maturity probably soon.** Engineer not appointed.

Ore., Salem—Barr & Cunningham, civil engrs., Spaulding Bldg., Portland, submitted 3 preliminary plans for new waterworks which contemplates taking over and adding to present privately owned plant, incl. **(1)** gravity system for North Santiam River $2,500,000; **(2)** pumping plant with filtration from Willamette River $1,685,000, with 5 m.g. reservoir; **(3)** pumping plant and reservoir without filtration plant $1,375,000, for City. Noted July 10, 1930.

Ont., Stamford—Stamford Twp., soon takes bids 1,600 water meters in connection with waterworks system. $12,000. M. F. Ker, Niagara Falls, engr.

BIDS ASKED

Colo., Colorado Springs—Aug. 20, by Broadmoor Hotel Water & Power Co., laying 12 mi. 9- to 13-in. pipe, 1,500 ft. 4 x 6 tunnels. H. I. Reid, Colorado Springs, ch. engr.

Mass., Medfield—Aug. 14, by Water Comn., Town Hall, P. Pederzin, chn., excavating, laying and backfilling for 29,484 ft., 8 in., 7,284 ft. 10 in., 21,288 ft. 6 in., 144 ft. 4 in. and 9,828 ft. 16 in. c.i. pipe. J. J. Van Valkenburgh.

Mich., Detroit—Aug. 15, by D. Dow, comr. Purchases & Supplies, Water Board Bldg., 735 Randolph St., 1,250 ft. 4-in. wrought iron pipe, f.o.b. Detroit, for Dpt. Water Supply.

N. J., Holmdel—Dpt. Institutions & Agencies, State Office Bldg., Trenton, taking bids water treatment plant, incl. aeration and filtration plant at New Jersey State Hospital. $15,000. Noted July 16.

N. J., Paterson—Aug. 17, at office Passaic Valley Water Comn., 156 Ellison St., electrical apparatus and wiring at Little Falls pumping station. F. A. Barbour and W. E. Fuller, engrs.; adv. E. N.-R. Aug. 12.

N. J., Wayne—Aug. 18, by Wayne Twp. Con., Town Hall, 12 mi. 6- to 14-in. pipe line, valves, hydrants for Sect. 1. W. Ferguson's Son, 152 Market St., Paterson Twp., engr.

N. Y., Brooklyn—Aug. 18, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in 1st, Dennett, Garfield and Mansfield Pls., Franklin, Knickerbocker, Riverdale and St. Marks Aves., Coles, Dean, Huntington, Luqueer, Pacific, Smith and 59th Sts.

N. Y., Long Lake—Aug. 20, by State of New York Water Power & Control Comn., at Raquette Lake House, Raquette Lake, earth dam with concrete core wall, preparing reservoir site, installing c.i. mains on lands of State Forest Preserve for Raquette Lake Water Dist. 1. William T. Field Engineers, Inc., Watertown, engr; adv. E. N.-R. Aug. 13.

N. Y., Long Lake—Aug. 20, by New York State Water Power & Control Comn., Town Hall, Long Lake, c/o Benedict Lahey, clk. Bd. Water Comrs., earth dam, with concrete core wall, preparing reservior site, appurtenances, on lands State Forest Preserve for Long Lake Water Dist. 2. William T. Field Engineers, Inc., Watertown, engrs. R. Suter, executive engr.

O., Toledo—Sept. 9, at office W. H. Schroeder, dir. P. Serv., Safety Bldg., constructing Broadway-Cherry Water Conduit. Fuller & McClintock, 170 Bway., New York, and H. P. Jones & Co., 1606 2nd Natl. Bank Bldg., engrs.; adv. E.N.-R. Aug. 13.

Pa., Jamestown—Aug. 15, by State Water Power & Resource Bd., at Harrisburg, Pymatuning Reservoir Dam, to form lake 16.5 mi. long, 2 mi. wide, 8,365,000 cu.ft. capacity, 370,000 cu.yd. embankment, 180,000 cu.yd. excav., 9,000 cu.yd. riprap, 5,000 cu.yd. concrete, 4,000 cu.yd. stone paving, 900 tons steel. $1,500,000. Noted May 28.

Ont., Westboro—Aug. 20, by A. E. Morris, clk. Nepean Twp., 21,750 lin.ft. 4- to 12-in. c.i. mains, 20,250 lin.ft. 9 and 12 in. vitr. tile sewers in General Contr. H; 18,200 lin.ft. 4 and 6 in. c.i. mains and 16,850 lin.ft. 9 and 12 in. vitr. tile sewers in General Contr. I. $75,000. James, Proctor & Redfern, 36 Toronto St., Toronto, engrs.

CONTRACTS AWARDED

Calif., San Francisco—S. J. Hester, secy. Bd. P. Wks., rein.-con. dam on Upper Alameda Creek, 10 mi. south of Sunol, to Barrett & Hilp, 918 Harrison St., $54,596. Noted July 9.

Mich., Eloise—Wayne Co. Supts. of Poor, City Serv. Bldg., Detroit, 1.5 m.g. rein.-con. underground water storage reservoir and c.i. supply main, also altering sewage treatment plant, to H. G. Christman-Burke Co., 1010 Fisher Bldg., Detroit.

N. Y., St. George—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Burke Ave., to P. Romando & Co., 272 Glen Ave., $42,000, Hobart Ave., to Melrose Constr. Co., 103 East 125th St., New York, $3,490. Noted July 16.

O., Cleveland—J. McSweeny, dir. Dpt. P. Welfare, 9th and Oak Sts., Columbus, 6 and 8 in. c.i. water mains at Hawthornden Farm, to J. A. Hickey, Inc., 308 Euclid Ave., $17,486. Noted July 23.

O., Lynchburg—Bd. Pub. Affairs, steel water tank, to Pittsburgh-Des Moines Co., Neville Island, Pittsburgh, Pa., pipe fittings, etc., to J. B. Clow & Sons, Wabash Bldg., Pittsburgh, Pa., concrete base, to E. F. Carlies & Sons Co., Fayettville. Est. $27,425.

Wash., Tacoma—City Council, replacements on Green River pipe line, to American Concrete Pipe Co., Tacoma, $75,780. Noted July 9.

Wis., Racine—City Council, light suction well, to P. Bondgard Constr. Co., 1135 Mount Ave., $40,500; heating, to Advance Heating Co., 1747 State St., $3,850; plumbing, to W. R. Pugh, 1215 West Blvd., $3,700. Grand total $48,050.

Ont., Kirkland Lake — City Council, water mains, sewers, in Carter and Taylor Aves., to McNamara Constr. Co., 53 Yonge St., Toronto, $40,000.

Ont., Toronto—W. J. Steward, mayor, City Hall, Tender No. 46, furnishing and installing 8 water tube steam boilers in John St. pumping station to John Inglis Co. Ltd., 14 Strachan Ave., $93,000; Tender 45 furnishing 16, 20, 24, 36 and 42 in. c.i. special castings to John T. Hepburn Co. Ltd., 18 Van Horne St., $3,478 to Ontario Wind Engine & Pump Co., Liberty St., $1,861; and to Dominion Wheel & Foundries Ltd., 171 Eastern Ave., $9,329. Grand total $107,668. Noted May 21.

SEWERS

PROPOSED WORK

Ariz., Miami—City Council, preliminary plans storm sewers, $95,000. J. Milton, city engr.

Calif., Bieber—See "Waterworks."

Calif., Los Angeles — City Council plans Anaheim Street and Badger Avenue Sewer, incl. 962 ft. 27 in. vitr. pipe sewers (D. & W. S.) 650 ft. 24 in., 1,920 ft. 18 in., 2,368 ft. 15 in., 675 ft. 12 in., 764 ft. 10 in. and 11,184 ft. 8 in. cement pipe (D. & W. S.), manholes, $97,200.

Calif., Los Angeles—City Council, 8- to 27-in. vitr. sewers, 150 manholes, 8- to 27-in. rein.-con. pipe in Vineland Ave. and Valley Spring Lane. $150,000 or more. City Eng. Dpt., engrs.

N. J., New Brunswick—Bd. City Comrs., City Hall, will not construct sewage disposal plant, $25,000. Project abandoned. Noted July 7.

N. J., Sayreville—Bd. Council, Boro Hall, preliminary plans 2 sewage disposal plants in different parts of town. $125,000. **Maturity late this fall.** W. S. Coulter, 120 Liberty St., New York, engr.

N. Y., Rome—Storm sewers and repaving South James St. from New York, Ontario & Western R.R. tracks to city line, $61,662. J. J. Gawkins, city engr.

N. Y., Syracuse—Onondaga Co., Court House, sanitary sewers for Onondaga County Home $20,000. Allen & Holmes, S. A. & K. Bldg., engrs.

Okla., Oklahoma City—City Council plans sanitary sewer extensions. $150,000. L. M. Bush, City Hall, engr.

Tex., Houston—City, c/o W. E. Monteith, mayor, plans 64 mi. 60 in. rein.-con. sanitary sewers in various streets. $400,000. J. M. Nagle, Houston, city engr. Noted Aug. 6.

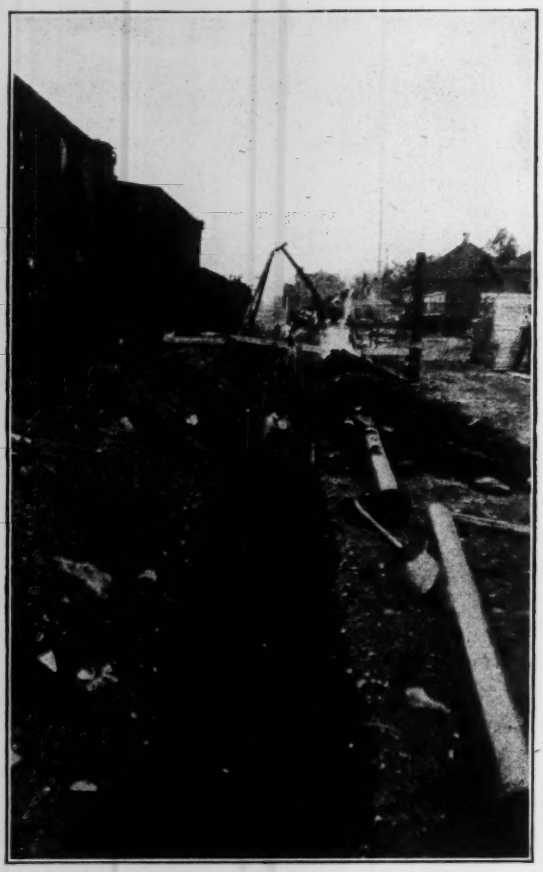
BIDS ASKED

Conn., Litchfield—Aug. 17, by Boro Bd., Town Hall, sewer main across Banam River, filter beds, underdrain sand filter and gravity line. $60,000. Morris Knowles, Inc., 507 Westinghouse Bldg., Pittsburgh, Pa., engr. Noted June 25.

See proposal advertising on page 81

Constr. News page 59

LEADITE



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Further,—the REASON why LEADITE is frequently used as a "standard" of comparison is very simple; i. e.—

LEADITE has been widely approved and used for over a quarter century,—has met every test required,—and in short, LEADITE has proven Dependable and Satisfactory in every respect.

LEADITE ***is the most extensively used self-caulking jointing material for bell and spigot water mains.***

LEADITE is used on thousands of miles of bell and spigot pipe throughout the country.

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Tested and used for over 30 years.
Saves at least 75%.

THE LEADITE COMPANY
Land Title Building Philadelphia, Pa.

No Caulking

Sewers (Continued)

Ind., Ft. Wayne—Aug. 25, by Bd. P. Wks., City Hall, South West Sewerage System, $111,782. A. Snyder, F. Wayne, secy.

Kan., Canton—Aug. 24, by City Council, 29,148 ft. 8- to 12-in. vitr. tile sewers, 60 ft. 8 in. c.i. pipe, 670 ft. 6 in. on 8 in. and 16 ft. 6 in. on 10 in. Y branches, 66 manholes, 12 flush tanks, 12 service connections, 108 ft. manholes, 1,900 ft. ¾ in. c.i. pipe, sewage treatment plant, incl. Imhoff tank, dosing tank, rock filters, sludge bed, by-pass. E. T. Archer & Co., New England Bldg., Kansas City, Mo., engrs.

Kan., Dodge City—Aug. 19, by E. C. Hathaway, city clk., 6 in. steel force main and outfall sewers across Arkansas River, also sewage disposal plant. Black & Veatch, Mutual Bldg., Kansas City, Mo., engrs.

Ky., Louisville—Aug. 20, by Commissioners of Sewerage, 400 Marion E. Taylor Bldg., Mill Creek Trunk Sewer, Contr. 58, incl. 3,955 ft. of 13 ft. 6 in. x 20 ft. 3 in., 2,760 ft. of 12 ft. 8 in. x 19 ft. and 150 ft. of 8 ft. 4 in. x 12 ft. 6 in. inverted egg shape rein.-con. sewer, overflow structures, junction chambers, manholes. W. M. Caye, 400 Marion E. Taylor Bldg., engr.

Ky., Louisville—Aug. 28, by Commissioners of Sewerage, 400 Marion E. Taylor Bldg., Trevilian Way Trunk Sewer, Sect. A, Contr. 59. W. M. Caye, technical engr.; adv. E.N.-R. Aug. 13.

Mass., Boston—Aug. 17, by Dpt. P. Wks., sewerage works in various streets, Dorcester, Hyde Park and West Roxbury. $25,000. J. A. Rourke, Dpt. P. Wks., comr.

Mass., Boston—Aug. 18, by City, sewerage works in Brighton, Aug. 19, Dorchester; and Aug. 21, West Roxbury. $25,000 or more. J. A. Rourke, Dpt. P. Wks., comr.

Neb., Coleridge—Aug. 18, by D. Mohr, city clk., 20,215 ft. 8- to 12-in. vitr. clay or concrete sanitary sewer pipe, 49 manholes, 2 drop manholes, 6 flush tanks, 1,000 ft. ¾ in. galvanized pipe, 1 bulkhead, Sect. A; disposal plant, incl. Imhoff tanks and dosing chamber, sprinkling filters, sludge bed, control manholes, fencing and seeding, pipe, Sect. B; sewage pumping plant, pump house, pit, two 50 g.p.m. nonclogging centrifugal pumps, 400 ft. 4 in. Class A and 60 ft. 4 in. Class C c.i. pipe, Sect. C. $37,108. Henningson Eng. Co., 326-30 Union State Bank Bldg., Omaha, engrs.

N. Y., Brooklyn—Aug. 19, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, storm water and sanitary sewers in Quentin Rd. between East 35th and East 36th Sts., and in East 35th St., between Avenue P and Quentin Rd.

N. Y., Long Island City—Aug. 17, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., sewers in Westgate Lane, Lakeview, 59th and 65th Pls., 116th Dr., 43rd, 87th, 116th Rds., 43rd, 63rd, 59th, 68th, Manse, Sybilla, 192nd, 201st, Moline, 87th, 183rd, Barron, 143rd, 144th, Chelsea, and 188th Sts., 47th, 52nd, 44th, 90th, 89th, 99th, 119th, 94th, Hillside, and 137th Aves.

N. Y., New York—Aug. 18, by Dpt. Water Supply, Gas & Electricity, Municipal Bldg., renovating sand filters at sewage disposal plant, Mount Kisco.

O., Shaker Heights (br. Cleveland)—Aug. 18, by City, storm sewer in Southington Rd. and culvert in Attleboro Rd. To exceed $40,000. F. A. Pease Eng. Co., Terminal Tower, Cleveland, engrs.

W. Va., Parkersburg—Aug. 18, by City Council, City Bldg., A. C. Murdock, mayor, sanitary sewerage system in Dist. 1, incl. 72,000 cu.yd. excav., 32,000 lin.ft. 6 in., 35,000 lin.ft. 8 in., 4,600 lin.ft. 10 in., 2,000 lin.ft. 12 in. and 1,350 lin.ft. 15 in. vitr. sewer pipe, 171 manholes, 4 flush tanks, repaving. L. G. Merrill, city engr. Morris Knowles, Inc., Westinghouse Bl., Pittsburgh, Pa., consult, engr.

CONTRACTS AWARDED

Ark., Benton—Arkansas Construction Comn., J. H. Hill, chn., Marion Hotel, Little Rock, sewage disposal plant and 26,000 ft. 12- to 18-in. sewers, manholes, appurtenances, for Farm Colony of State Hospital for Nervous Diseases, to McEachin & McEachin, Little Rock, $74,752.

Calif., Los Angeles—See "Streets and Roads."

Calif., Los Angeles—Bd. P. Wks., City Hall, Oliver Street and Marshall Sewer Dist., 8 in. concrete pipe sewer house connections, manholes, resurfacing to M. Miller, 208 West 2nd St., $28,020.

Calif., Los Angeles—City Council, Sect. 1 San Pedro Interception Sewer in right-of-way east of Pacific Ave., incl. 4,960 lin.ft. 20 in. c.i. pipe, 327 ft. vitr. pipe sewers, structures, remodeling wooden stairway, rein.-con. trestles, appurtenances, also resurfacing, to L. R. Weber, 603 20th St., Santa Monica, $49,696.

Conn., Wethersfield—For 8,000 ft. sanitary sewers in Wells Rd. $22,050. Owner builds.

Kan., Wichita—C. C. Ellis, city clk., general work sewage disposal plant, to M. E. Gilloiz, Monett, Mo., $307,368—excavation and other work, to Indiana Sand & Gravel Co., Wichita, $11,730; fence around plant, to Wichita Fence & Supply Co., Wichita, $3,148; switchboard and electric wiring, to Shelly Electric Co., 123 South Main St., $5,776; gas holder, to Darby Corp., 923 North 3rd St., Kansas City, $2,287; pumps and motors, to DeLaval Pump Co., Trenton, N. J., $13,187; digesters, to Harding Co., York, Pa., $35,100; mechanically cleaned bar screens and clarifier equipment, to Link Belt Co., 300 West Pershing Rd., Chicago, Ill., and Hunting Park Ave. and Niceton, St., Phila., Pa., $24,433. Grand total $403,031. This corrects report in July 23 issue. Noted June 19.

Ky., Louisville—Commissioners of Sewerage, 400 Marion E. Taylor Bldg., F. D. Walsh, act. chn., Beargrass Intercepter, Sect. H, Deer Park Sewer Connection and Jefferson County Cantonment Sewer Relocation, Contr. 56, incl. 6,937 lin.ft. 27- to 54-in. circular reinforced or plain sewer, outlet structures, diversion and regulator chambers, inverted siphon with inlet and outlet chambers, manholes, 7,220 cu.yd. excav., 2,000 cu.yd. concrete, 102,000 lb. steel reinforcing bars, to J. B. McCrary Co., Citizens & Southern Bank Bldg., Atlanta, Ga., $91,452. Noted July 16.

Md., Baltimore—Bd. Awards, storm drains in Druid Hill Park, around Druid Hill Lake, Storm Water Contr. 168, incl. 6,490 lin.ft. 24 and 36 in. rein.-con. pipe, 105 lin.ft. 12 and 15 in. inlet connections, 92 lin.ft. standard manhole, to D. Cellinese, 213 South High St., $7,455.

Mass., Boston—Metropolitan Dist. Comn., 20 Somerset St., Sect. 118, New Neponset Valley Sewer, South Metropolitan System, incl. 36 x 39 in. culvert, Norwood and Walpole, to C. & R. Constr. Co., 75 Bradeen St., Roslindale, $42,575.

Mich., Dearborn—City, brick, steel, concrete, stone, terra cotta sewage disposal plant, to W. H. Mueller, 2111 Woodward Ave., Detroit, $242,000.

N. J., Little Falls—Twp. Comn., Municipal Bldg., enlarging and improving sewage disposal plant, to F. N. Lewis Co., 136 Liberty St., New York, N. Y., $92,293. Noted July 2.

N. Y., Pocantico Hills—J. D. Rockefeller, Jr., 26 Bway., New York, sewerage system to connect with North Tarrytown and Mount Pleasant sewers. Owner awarded separate contracts. $100,000.

O., Cleveland—City sewer in Cuyahoga Valley to M. Iafornaro-Gillotto Co., 5005 Euclid Ave., $30,681—West 130th St. to Amato Constr. Co., 3610 East 161st St., $4,992—Broadway Sanitary connection to Mill Creek Intercepting Sewer, incl. 15 ft. 3 ft. C, 260 ft. 5 ft. D and 690 ft. 5 ft. C brick sewers in tunnel to Kassouff Constr. Co., 2600 Althen Ave., $25,800. Grand total $61,473.

Ore., Portland—City Comrs., storm sewers in 30th Street Industrial Dist., to Parker Schram Co., Couch Bldg., $102,153. Est., $147,619.

Ore., Portland—City Comn., storm sewer in Guilds Lake Dist., to Parker-Schram Co., Couch Bldg., Portland, $102,153. Noted July 10.

WASTE DISPOSAL

CONTRACTS AWARDED

N. J., Kearny (sta. Arlington)—Bd. Town Council, Town Hall, 150 ton incinerator, to Decarie Incinerator Co., 342 Madison Ave., New York, $163,856. Noted July 20.

BRIDGES

PROPOSED WORK

California — State Hy. Comn., Sacramento, plans Towle Grade Separation under Southern Pacific R.R., Placer Co., $20 — bridge over Russian River, $30,000—and Cedar Creek and Don Creek Bridges, $284,000, all Mendicino Co. —grade separation, San Bernardino Co., $30,000 —bridges in Merced Co., $40,000—Los Alamos Creek Bridge, Santa Barbara Co., $31,000—bridge in Humboldt Co., $43,500—bridge over Kern River, Kern Co. $400,000—bridge over San Benito River, $140,000—bridge over San Juan Creek, $10,000, both San Benito Co. C. H. Purcell, hy. engr. **Maturity this year.**

Calif., Los Angeles—State Hy. Comn., Sacramento, completing plans drilling foundation test holes for bridge over San Francisco Bay connecting San Francisco with Alameda Co. $150,000. Total est. $75,000,000. C. H. Purcell, hy. engr.

N. J., Browns Mills—Twp. Com. Cinnamansen Twp., plans creosoted timber bridge over White Canal. $25,000. Project abandoned. Noted July 16.

N. J., Union City and Hoboken—Bd. Chosen Freeholders, Court House, Jersey City, improving 14th St. viaduct, Sect. 1, from Union City to Hoboken. $25,000. F. J. Radigan, Court House, Jersey City, co. engr.

Okla., Wilburton—State Hy. Dpt., Oklahoma City, preliminary plans 1 span 120 ft. steel truss bridge on concrete piers, Latimer Co., here. $30,000. A. R. Losh, hy. engr.

Ont., Dresden—Kent Co., plans replacing 300 ft. long structural steel and concrete Huntley Bridge over Sydenham River. $100,000. W. D. Colby, Harrison Hall, Chatham, engr.

Ont., Galt—Bd. Works, W. W. Wilkinson, chn., soon takes bids 2 span, rein.-con. bridge, Main St. $65,000. A. B. Crealock, c/o Deveral and Crealock, 702 Kent Bldg., Toronto, engrs. Noted July 17.

BIDS ASKED

Ill., Carthage—Aug. 17, by Bd. Comrs. Hancock Co., one 80 ft., two 35 ft. span steel superstructure, Sect. C-M.F.T.; substructure, incl. 2 pile abutments, 2 pile piers, D-M.F.T. G. H. Baker, c/o State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, engr.

Indiana—Aug. 25, by State Hy. Comn., Indianapolis, 28 x 24 ft. rein.-con girder bridge over Huffman Branch Stock Ditch near La Paz—72 x 24 ft. steel truss and 40 x 28 ft. concrete arch bridge over Yellow River near Bremen, all Marshall Co.—30 x 32 ft. rein.-con. arch bridge over Berlin Court Ditch—32 x 24 ft. rein.-con. girder bridge over Wagner Ditch—96 x 24 ft. steel truss bridge over Turkey Creek, all near Nappanee, Elkhart Co. —40 x 24 ft. rein.-con girder bridge over Middle Fork Wildcat Creek, State Rd. 29, Clinton Co.—28 x 24 ft. rein.-con. girder bridge over East Fork Honey Creek, near Russiaville —36 x 24 ft. rein.-con girder bridge over Little Wildcat Creek near Russiaville, both Howard Co.—36 ft. arch underfill, Plum Creek—40 x 24 ft. rein.-con. bridge over East Fork Plum Creek, both near Bainbridge, Putnam Co.—five 30 ft. 9 in. span rein.-con girder bridge, 24 ft. roadway, grading approaches, near Earl Park, Benton Co.—two 72 ft., one 198 ft. steel truss bridge, 22 ft. roadway over Mucks Pond, near Mt. Carmel—three 25 ft. span I-beam bridge, 24 ft. roadway over McCarthy Ditch, near Princeton—30 x 24 ft. rein.-con. girder bridge over Richland Creek near Princeton, all Gibson Co.—three 40 ft. span rein.-con girder bridge, 24 ft. roadway over Hannah Creek, near Liberty, Union Co. J. J. Brown, dir.

Iowa—Aug. 18, by State Hy. Comn., Ames, 130 x 20 ft. high truss bridge with four 50 x 20 ft. I-beam approach spans, on Bussey Stub, B-753—57 culverts, extensions, on Knoxville Rd., B-600 both Marion Co.—40 x 20 ft. I-beam addition to bridge, Rd. 4B-6220, Mills Co.—overhead crossing incl. two 90 x 24 ft. plate girder spans with four 26 x 24 ft. I-beam approach spans, Rd. 20, near Ackley, X-950, Hardin Co. C. R. Jones, asst.

Kan., Kansas City—Aug. 18, by Ash Howard & Tammen & Needles, engrs., 1012 Baltimore Ave., Kansas City, Mo., repairing viaduct over 10th St., recently damaged by fire, for City. $62,500.

Kentucky—See "Streets and Roads."

Massachusetts—Aug. 25, by Dpt. P. Wks., State House, Boston, A. W. Dean, engr., concrete substructure for bridge over Connecticut River, Gill and Erving. $25,000 or more.

Mass., Boston—Aug. 18, by Dpt. P. Wks., reconstructing steel and concrete bridge on Albany St. over Boston & Albany R.R. $25,000. J. A. Rourke, Dpt. P. Wks., comr.

New Jersey—Aug. 24, by State Hy. Comn., Trenton, Bridges on Routes 2, Sect. 6 at Terrace Ave. and Central Ave., boroughs of Hasbrouck Heights and Maywood, Bergen Co., incl. 3,145 cu.yd. excav., 3,452 cu.yd. concrete, 214,350 lb. reinforcing steel, 431,900 lb. structural steel. A. L. Grover, ch. engr.; adv. E. N.-R. Aug. 13.

N. J., Bound Brook—Bd. Freeholders Somerset Co., (Somerville) and Middlesex Co. (New Brunswick) bids about Aug. 15, steel and concrete bridge over Green Brook at East Main St. $25,000. W. F. Buchanan, 280 Hobart St., Perth Amboy, engr. Middlesex Co. and O. Smith, Court House, Somerville, engr. Somerset Co. Noted June 18.

New York—Aug. 31, by A. O. Smith Hy. Supt. at office Bd. Supervs. Suffolk Co., Riverhead, constructing superstructure Shelter-Island-Sag Harbor Bridge, at Sag Harbor and Shelter Island Greenport Bridge, near Greenport, Robinson & Steinman, 117 Liberty St., New York, consult. engrs.; adv. E. N.-R. Aug. 13. Noted July 16.

N. Y., Carmel—Aug. 14, at office Taconic State Park Comn., 25 Market St., Poughkeepsie, overcrossing at Peekskill Hollow Rd. and river bridge, at Peekskill Hollow Creek, Sect. 1, Part 2, Eastern State Parkway, Putnam Co. J. W. Bradner, Jr., ch. engr.

Pa., Pittsburgh—Aug. 25, by R. G. Woodside, controller Allegheny Co., Court House, South Approach West End-North Side Bridge over Ohio River, incl. raising Carson St., removing 40 buildings. $1,070,000. V. R. Covell, County Bldg., engr.

Okla., Tulsa—Aug. 19, by E. Logan, aud. Tulsa Co., 6 span 400 ft. rein.-con. viaduct on 3rd St. $100,000. H. A. Parker, City Hall, engr.

Pa., Pittsburgh—Aug. 18, by R. G. Woodside, Court House, hand railing for Boston Bridge over Youghiogheny River. $38,000. V. R. Covell, County Bldg., engr. Noted May 14.

Virginia—See "Streets and Roads."

B. C., Ashcroft—Aug. 24, by Minister of Pub. Wks., Victoria, 540 ft. timber or steel bridge on concrete piers over Thompson River. $100,000. P. Philip, Dpt. P. Wks., Victoria, engr. Noted June 11.

Ont., Galt—Aug. 14, by J. McCartney, city clk., 2 span 250 ft. rein.-con bridge over Grand River, on Main St. $100,000. A. B. Crealock, Kent Bldg., Toronto, engr. Noted July 16.

Ont., Kitchener—Aug. 20, by S. Cassel, clk. Waterloo Co., Kraemer Bridge, 14 ft. span, concrete, near Linwood—West Bridge, 24 ft. span, near Wallenstein—East Bridge, 40 ft. span, rein.-con., near Wallenstein. $25,000. L. S. Lichty, engr.

CONTRACTS AWARDED

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, double 40 ft. span steel and concrete girder bridge, Contr. F-119-57, Frederick Co., to M. J. Grove Lime Co., Lime Kiln, $14,696—gunite work in connection with existing bridge over Beaver Creek, Contr. W-95-611, Washington Co., to T. A. Ward, 1824 North Caroline St., Baltimore, $1,495. Noted July 23.

Mich., Port Huron—E. C. Fitzpatrick, city clk., substructure for bridge over Black River at 7th St., to Willits Brothers, Grand Haven, $110,335; superstructure, to Wisconsin Bridge & Iron Wks., 5023 35th St., Milwaukee, Wis., $92,840. Noted June 11.

N. J., Atlantic City—Bd. Freeholders Atlantic City, reconstructing steel and concrete bridge over Hammontown Creek, Columbia Rd., Mullica Twp., to G. Hanselman, Egg Harbor City. Est. $25,000. Noted July 2.

N. J. Brielle—Bd. Freeholders Monmouth Co., Court House, Freehold, 5,463 mi. highway bridge between Brielle and Belmar, incl. 89,886 sq.yd. 9-in. rein.-con. pavement, constructing 4 bridges, to G. Gentile, Bridgeton, $366,604. Noted June 11.

New Jersey—State Hy. Comn., Trenton, steel superstructure with ramp connections, foundations, retaining walls, embankment, paving, incidental work, Route 25, Connecting Link, Sects.

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Bridges (Continued)

8 and 8-A, Contr. 51 Essex Co., to International Eng. Co., foot Front Sec. Palisade, Jersey City, $390,134. Noted July 16.

New York—A. W. Brandt, comr. Hys., Albany, bridge in Tompkins Co., to K. S. Baker, Binghamton, $77,852 est. $104,754—bridge in Clinton Co., to P. J. Murtaugh, Plattsburg, $30,146 est. $40,770—bridge in Erie Co., to A. A. Howard, Warsaw, $49,770 est. $84,642—bridges in Franklin and Schoharie Counties, to C. W. Ryan, New York, $22,358 and $8,141 respectively; est. $31,982 and $11,141 respectively —in Franklin Co. to K. J. Premo, Massena, $39,984 est. $61,475. Grand total $228,230. Noted June 18 and 25 under "Streets and Roads."

N. Y., Flushing—New York and Queens Electric Light & Power Co., 40-22 Lawrence St., underpinning for bridge approach, Roosevelt Ave. and Lawrence St., to Spencer White & Prentis, 10 East 40th St., New York.

Ohio—O. W. Merrell, dir. hys., Columbus, one 28.28 ft. and one 33.94 ft. span, concrete slab bridges, over Beaver Dam Pitch, 30 ft. roadways and approaches, Champaign Co., to A. M. Hessler, 1747 McAllister Ave., Columbus, $61,384—37 ft. span, concrete slab bridge, over branch Sycamore Creek, 24 ft. roadway and approaches, Crawford Co. to C. Huth, West Market St., Tiffin, $7,652—two 25 ft. spans, concrete slab bridge, 34 ft. roadway, Medina Co. to McDonald Constr. Co., Norwalk, $6,988—40 ft. span steel I-beam bridge, 36 ft. roadway, timber flooring on present abutments, Geauga Co., to H. L. Maddocks, 299 Merchant St., Newark, $7,924—three 45.38 ft. spans, rein.-con. beam bridge, with one 4.5 ft. sidewalk over Little Darby Creek, Madison Co., to Luten Bridge Co., Inc., Clarksburg, W. Va., $23,770—continuous I-beam bridge, with 80 ft. center span and two 60 ft. and spans, 24 ft. roadway over Big Darby Creek, Union Co., to Dodge-Hussey, Inc., 1174 West 5th Ave., Columbus, $22,214—40 ft. span, concrete beam bridge, 24 ft. roadway, Darke Co., to J. A. Flayler, Ansonia, $6,394—three 60 ft. spans, concrete filled spandrel bridge, and approaches over Sandusky River, 34 ft. roadway, two 3.6 ft. sidewalks, Wyandot Co., to Kear & Baker, Wharton, $64,256. Grand total $200,582. Noted July 16.

West Virginia—State Roads Comn., Charleston. **(P. means Project)** Caldwell Bridge 1280, P. 3505 Greenbrier Co., to Clark & Lewis, Luray, $18,782—Big Run Bridge, P. 3413 Jackson Co., to C. C. Dodd, Spencer, $7,297—New Creek Bridge 1232, P. 3010 Mineral Co., to Hambleton Constr. Co., Hambleton, $16,364—Red Mill Bridge 1284, P. 3462-A Monroe Co., to Echols Bros., Inc., Alderson, $7,201—Mill Point Bridge 1266, P. 2191 Pocahontas Co., to Pocahontas Constr. Co., Cass, $7,275—Dye Bridge 1268, P. 143-C Ritchie Co., to Nelson & Conley, Harrisville, $12,455—Carpenter Bridge 1269, P. 143 Ritchie Co., and Wilson Bridge 1270, P. 143-D, both Ritchie Co., to G. R. Clarke, Williamstown, $7,633 and $7,484 respectively. Grand total $84,511. Noted July 23 under "Streets and Roads."

STREETS AND ROADS

BIDS ASKED

Ark., Clarksville—L. King, D. Dyer and W. Spanks, comrs. Street Improvement Dist. 4, bids about Sept. 1, grading, drainage structures, guttering, concrete paving 1.5 mi. Main St., 36 ft. $75,000. F. Prichett, Little Rock, engr.

Ark., Rogers—Bd. Comrs. Benton Co., constructing 12 mi. road between Rogers and Cave Springs. **Maturity indefinite.** This corrects report in Aug. 6 issue. Noted Aug. 6.

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., received no bids July 27, grading, drainage structures, sewers, curbing, guttering, sidewalks, 4 in. disintegrated rock paving with rock and oil surface 890,000 sq.ft. County Improvement 974 Flower Ave, $56,200.

Calif., Los Angeles—Aug. 19, by Bd. P. Wks., City Hall, grading, curbing, guttering, sidewalks, 6 in. concrete paving 140,000 sq.ft. Baird Ave., et al.

Connecticut—Aug. 17, by J. A. Macdonald, state hy. comr., State Office Bldg., Hartford, road work in Redding, West Haven, Bethlehem, Bozrah, Canton, Colebrook, Derby, Easton, Franklin, Goshen, Marlboro, Meriden, Norfolk, Southington, and Thomaston; adv. E.N.-R. Aug. 13.

Conn., New Britain—Taking bids bituminous macadam paving Stanley St. from Kelsey St. to town line. $25,000.

Ill., Bloomington—Aug. 15, by B. Comrs. McLean Co., gravel surfacing 3.0358 mi. Q-M.F.T.—4.9049 mi. M-M.F.T.—5.5375 mi. L-M.F.T., 14 an 16 ft. wide. G. H. Baker, c/o State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, engr.

Ill., Carlisle—Aug. 17, by Bd. Comrs. Clinton Co., concrete paving 2.09 mi. Z-15d, 9 ft. G. H. Baker, c/o Dpt. P. Wks. & Buildings, Div. Hys., Springfield, engr.

Ill., Galesburg—Aug. 15, by Clerk Knox Co., grading, culverts, gravel surfacing Sect. N-M.F.T. State Aid Route 19, incl. 41 units hedge pulling, 18,968 cu.yd. excav., 9,816 tons gravel pavement, 194 ft. 15 in., 520 ft. 12 in. rein.-con pipe, 13,739 lb. reinforcing and 45,020 lb. structural steel, 1,454 lin.ft. creosoted piles. A. R. Smith, Galesburg, engr.

Ill., Hennepin—Aug. 20, by Bd. Comrs. Putnam Co., gravel surfacing 2.27 mi. Sect. J-M.F.T. G. H. Baker, c/o State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, engr.

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Ind., Evansville—Aug. 17, by Bd. Comrs. Vanderburgh Co., concrete surfacing Zillak Rd. $16,906. E. W. Keoneman, Evansville, co. aud.

Iowa—Aug. 18, by State Hy. Comn., Ames, grading, drainage structures, paving 0.67 mi. U. S. Rd. 65 from Iowa Falls, P-642-J Hardin Co.—0.08 mi. Rd. 59 south of Tama, F-257 Tama Co.—grading, drainage structures 12.854 mi. Rd. 14 from Knoxville, P-660 Marion Co. —0.31 mi. Iowa Falls Rd. P-642 Hardin Co.—gravel surfacing 4 mi. Rd. 14 south of Allison, P-71 Butler Co.—6 mi. Rd. 46 P-8 Crawford Co.—3 mi. Rd. 54 from Marble Rock, P-668—6.5 mi. Rd. 147 from Rockford, P-669, both Floyd Co.—12.8 mi. Rd. 3 from Sidney south, P-701 Fremont Co.—13.5 mi. Rd. 3 P-778 Decatur Co.—19.3 mi. Rd. 3 from Benton, P-779 Ringgold Co. C. R. Jones, aud.

Iowa—State Hy. Dpt., Ames, rejected bids July 21, bituminous surfacing 1,450 lin.ft. roads in Boone Co.—3,700 lin.ft. Marshall Co.—1,600 lin.ft. Hardin and Franklin Counties—1,500 lin. ft. Hardin Co.—1,320 lin.ft. O'Brien Co. Noted July 16.

Kan., Kansas City—Aug. 18, by H. Payne, city clk., brick, rock asphalt or concrete paving State Ave. from 18th to 25th Sts., 18th St. from Kansas Ave. to 18th Street Viaduct, $25,000. C. E. Peterson, City Hall, engr.

Kentucky—Aug. 26, by State Hy. Dpt., Frankfort, surfacing 7.4 mi. Murray-Hazel Rd., Calloway Co.—5.4 mi. Benton-Mayfield Rd., Marshall Co.—bridge, incl. 23 I-beam and 102 ft. plate girder spans, steel towers and bents, concrete floor, sidewalks, stairway, lighting system on substructure, incl. abutments, piers, pedestals, piles, retaining walls, 400 ft. north of Boyd-Greenup Rd., Boyd Co.—five 50 ft. concrete deck girder span bridge, rein.-con. piers, abutments over Elkhorn Creek on Frankfort-Owenton Rd., also grading approaches, Franklin Co. B. Johnson, chn.

Louisiana—Aug. 25, by **State Hy. Comn.**, Baton Rouge, grading, drainage structures, washed gravel surfacing 5.257 mi. Intersection Route 214-Palmetto Hy., St. Landry Parish—5.644 mi. Converse-Myricks Ferry Rd., Sabine Parish—grading, drainage structures, local iron ore surfacing 7.199 mi. Midway-Ivan Hy., Bosier Parish—9.361 mi. Farmersville-Spearsville Hy., Union Parish—8.323 mi. Jonesboro-Midway Church Rd.—5 mi. Jonesboro-Walkers School-Midway Church Rd., both Jackson Parish—grading, drainage structures, clam or reef shell surfacing 7.64 mi. Polkville-Arnaudville Hy., St. Martin and St. Landry Parishes—3.14 mi. Palm School Rd., St. Martin Parish—3.65 mi. Waterproof-Menzies School Hy., Tensas Parish—grading, drainage structures, gravel surfacing 6.629 mi. Armaugh-Acme Hy., Concordia Parish —4.205 mi. Gilbert-Fort Necessity Hy., Franklin Parish—sand clay surfacing 3.705 mi. Hope-Sailes Hy., Bienville Parish—grading, drainage structures 6.497 mil. Dorra-Gorrenta Hy., Ascension Parish. H. B. Henderlite, hy. comr.

Louisiana—Aug. 25, by State Hy. Comn., Baton Rouge, grading, drainage structures 9.3 mi. Merryville-Starks Rd., Beauregard Parish—5 mi. Brooklyn-Sikes Rd., 5 mi. Quitman Rd., both Jackson Parish—7.2 mi. Rhinehart-Nebo Rd., LaSalle Parish, 4 mi. Woodville-Route 4 Rd.—5 mi. Routes 227,228 and 441, both Lincoln Parish—7 mi. Route 39-Varnills Mill Rd., Natchitoches Parish—8 mi. Ouachita-Jackson Parish Line Rd., Ouachita Parish—9 mi. Hornheik-Piszah School Rd., Sabine Parish—6 mi. Mt. Union School-Arkansas State Line Rd., Union Parish—9 mi. Sikes Rd., Winn Parish—10 mi. Olla-Sikes Rd., LaSalle, Caldwell and Winn Parishes—grading, gravel surfacing 7.2 mi. Yellow Bayou-Odenburg Rd., Avoyelles Parish—6 mi. Castor intersection with Route 13, Bienville Parish—5.1 mi. Columbia-Enterprise Rd., Caldwell Parish—6 mi. Hunter-Sabine Parish Line Rd., DeSoto Parish—6 mi. Winnsboro-Big Bear Rd.—6 mi. Bakers Plantation-Central School Rd.—6 mi. Haskins-Bayou Rd., all Franklin Co.—7 mi. Alabama Church Rd. and intersection Route 115, Lincoln Parish—8.2 mi. Warsaw Ferry-Waverly Rd.—5 mi. Waverly-Warsaw Ferry Rd., both Madison Parish—10 mi. Robeline-Allen Rd., Natchitoches Parish—7 mi. hy. north from West Monroe, Ouachita Parish—9 mi. Hineston-Union Hill Rd., Rapides Parish—7.6 mi. Route 225 Red River Parish—7 mi. Goldman Rd., Tensas Parish—5 mi. Fragmore-Clayton Rd., Concordia Parish—7.1 mi. Evers-Oak Ridge Rd., West Carroll and Richland Parishes—5.9 mi. Duteltown-St. Gabriel Rd., Ascension and Iberville Parishes—9 mi. Route 140 and 1060, Allen Parish—grading, drainage structures, surfacing 6.6 mi. Routes 517 and 805—2.7 mi., Routes 800 and 807, both Vermillion Parish—6 mi. McCrea-Datrache Rd., Pointe Coupee Parish — grading, drainage structures, shell surfacing 4 mi. Bayou False-Lake Fields JRd., Lafourche Parish—grading, drainage structures, local iron ore surfacing 5 mi. Jonesboro-Midway School Rd., Franklin Parish—6.6 mi. Heflin-Duherly Rd., Webster Parish—asphaltic surface treating 7 mi. Cecelia-Armandville Rd., St. Martin Parish—concrete surfacing 5.9 mi. Abberville-Lafayette Rd., Vermillion Parish. H. B. Henderlite, hy. comr.

Maryland—Aug. 18, by Dpt. P. Wks., State Roads Comn., Baltimore, improving 1.34 mi. roads in Baltimore Co.; 2.5 mi. road in Prince George Co. G. L. Uhl, chn.; adv. E. N.-R. Aug. 14.

Md., Baltimore—Aug. 19, by Bd. Awards, sheet asphalt paving 7,800 sq.yd. streets in Contr. 603; concrete paving 13,650 sq.yds. Contr. 602. N. L. Smith, hys. engr.

Massachusetts—Aug. 18, by Dpt. P. Wks., State House, Boston, A. W. Dean, engr., bituminous macadam paving 3,500 ft. Holliston—4,850 ft. Sherborn—4,975 ft. Attleboro—graveling, bituminous macadam paving 5,800 ft. Plainville.

Mass., Boston—Aug. 17, by Dpt. School Buildings, grading, paving grounds at Wm. Bacon and Geo. T. Angell Schools. $25,000. Private plans.

Mass., Boston—Aug. 17, by Dpt. P. Wks., sheet asphalt or bituminous paving Gladstone St., Ward 1, and Aug. 21, Peter St., Ward 19, $25,000; Aug. 20, Butler and Medway Sts., Ward 17, $27,000. J. A. Rourke, Dpt. P. Wks., comr.

Mass., Boston—Aug. 13, by Dpt. P. Wks., sheet asphalt or bituminous paving Wildwood and Lewis Sts., Wards 14 and 1. $25,000. J. A. Rourke, comr., Dept. P. Wks.

Mass., Boston—Aug. 18, by Dpt. P. Wks., sheet asphalt or bituminous paving Webster and Clyde Sts., Ward 1. $25,000. J. A. Rourke, Dpt. P. Wks., comr.

Mass., Cambridge—Aug. 17, by Street Dpt., sheet asphalt paving. $25,000. W. R. McMenimen, City Hall, supt.

Minnesota—Aug. 18, by State Hy. Dpt., St. Paul, concrete paving 59,000 sq.yd. State Project 9-28—0.7 mi. S.P. 7-45—2.5 mi. S.P. 57-21.

Mo., St. Louis—Aug. 18, by Bd. P. Wks., 208 City Hall, curbing, guttering, sewers, concrete paving 33,905 sq.yd. Riverview Dr. from St. Cyr Ave. to north line Riverview Park Subdivision $100,760—27,795 sq.yd. Riverview Dr. from north line Riverview Park Subdivision to north line Survey 115, $70,000—granite curbing, guttering, asphalt on concrete paving 30,200 sq.yd. Kingshighway-Northwest St. from West Florissant Ave. to Halls Ferry Circle, $152,100—asphaltic concrete paving 2,875 sq.yd. Park Lane from McLauren Ave. to Goodfellow Blvd., $17,440—reconstructing 11th St., incl. warrenite bithulithic on concrete paving 1,885 sq.yd. paving from Hart to Branch Sts. $12,400. W. W. Horner, 300 City Hall, engr.

Nebraska—Aug. 20, by Dpt. P. Wks., Lincoln, grading, graveling 246.7 mi. roads—oil-sand surfacing 18.8 mi. roads—patrol graveling 153.5 mi. roads. R. L. Cochran, state engr.

Neb., Wilber—Aug. 18, by B. J. Klasek, clk. Saline Co., Project 1-A, gravel surfacing 73,920 yd. $7,392—Project 1-B, 5,867 yd. $391—Project 2, 35,200 yd. $2,347—Project 3, 100,020 yd. $10,032—Project 4-A, 39,960 yd. $3,696—Project 4-B, 42,240 yd. $4,224—Project 5-A, 7,920 yd. $792—Project 5-B, 10,560 yd. $1,056.

New Jersey—Aug. 24, by State Hy. Comn., Trenton, grading, 9 in. rein.-con. paving 170,675 sq.yds., bituminous macadam paving 2,461 sq.yd., also small bridges, Route 38, Sect. 1, connecting road to Kingshighway, and Route S-41, Sect. 1-B, Hilton Rd. to Kings Highway, Camden and Burlington Counties; grading, rein.-con. paving 4,305 sq.yd. Route 48, Sect. 26, Traffic Circle at Route 46, Pittsgrove, Salem Co. A. L. Grover, ch. clk.; adv. E. N.-R. Aug. 13.

New York—Sept. 2, by A. W. Brandt, comr. Hys., Dpt. P. Wks., Albany, improving roads in Cayuga Co.; reconstructing roads in Cattaraugus, Cortland, Delaware, Dutchess, Putnam, Erie, Niagara, Oswego, Rockland, Tioga, Wayne and Wyoming Counties; adv. E.N.-R. Aug. 13.

N. Y., Lawrence — Aug. 19, by Bd. Village Trustees, grading, concrete paving 9,700 sq.yd. and bituminous concrete repaving 6,800 sq.yd.

N. Y., New York—Aug. 18, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading, sidewalks, sheet asphalt on concrete paving Crotona Pl., East 168th St. and Stone Ave., bituminous concrete paving Furman Ave., grading, etc., Lydig, Pitman, Bussing, Grace and Edson Aves.

N. Y., St. George—Aug. 19, by J. A. Lynch, pres. Richmond Boro, Boro Hall, bituminous concrete paving Amboy Rd., Gibson and Fillmore Aves.

O., Cleveland—Aug. 14, by Bd. Comrs. Cuyahoga Co., vitr. brick or sheet asphalt paving 10,200 sq.yd. Fairmount Blvd. $93,700, vitr. brick paving 8,350 sq.yd. and sheet asphalt paving 2,250 sq.yd. Fairmount Rd. 20. $71,400. B. F. Williams, Court House, engr.

Pennsylvania—Aug. 28, by State Hy. Dpt., Harrisburg, improving 4.5 mi. roads in Clarion, Dauphin and Montgomery Counties. S. S. Lewis, secy.; adv. E. N.-R. Aug. 14.

Pa., Pittsburgh—See "Bridges."

Tex., Brownsville—Aug. 27, by Cameron Co., c/o O. C. Dancy, judge, concrete paving 1.5 mi. Boca Chica Rd.—grading, bridging 1.5 mi. B-38, Boca Chica Rd.—1.1 mi. B-39 Morton Rd.—4.8 mi. B-40 Coffee Rd. W. O. Washington, co. engr.

Utah—Aug. 18, by State Rd. Comn., Salt Lake City, bituminous concrete or rock asphalt paving 3.5 mi. Lincoln Hy., from mouth of Parley's Canyon to cement plant—concrete paving 4,000 cu.yd. 33rd St., both Salt Lake Co.—grading, crushed gravel surfacing 5.043 mi. hy. between Eagle and Meridian, Ada Co.—crushed rock surfacing 13.2 mi. Genesee-Thorn Creek Sect. of North and South Hy., Latah Co.

Utah—Aug. 19, by State Road Comn., Salt Lake City, grading, graveling 9.31 mi. hy. from Vernal to Jensen, Vintah Co. H. S. Kerr, Salt Lake City, state road engr.

Virginia—Aug. 25, by State Hy. Dpt., Richmond, grading, drainage structures, macadam surfacing 13.5 mi. Route 40, Project F-326-AB, Norfolk Co.—0.14 mi. Route 33, Project F-640-A1, Roanoke Co.—27.6 ft. rein.con. span bridge Route 31, Project F-173-B1, Chesterfield Co. H. G. Shirley, hy. comr.

Streets and Roads (Contnued)

Wyoming — Aug. 18, by State Hy. Comn., Capitol Bldg., Cheyenne, grading, constructing 15 timber trestles, miscellaneous work 26.712 mi. F.A.P. 44, 59-A and 59-B, combined on Medicine Bow-Walcott Rd., Carbon Co.—gravel surfacing 9.819 mi. Federal Lands Hy. Project 1-A, Worland-Tensleep Rd., Washakie Co.—oil treating 14.414 mi. S.P. 957, Lingle-Lusk Rd., Goshen Co.—F.A.P. 201-A, 48-B and S.P. 881, 2.213 mi. Wheatland-Douglas Rd. and 7.155 mi. Orin-Lusk Rd., Converse Co.—pile trestle State Projects 945 and 944 combined, Goshen Co.

Ont., Fort William — See "Contracts Awarded."

Ont., Hamilton—See "Contracts Awarded."

Ont., Kingston—See "Contracts Awarded."

Ont., Toronto—See "Contracts Awarded."

CONTRACTS AWARDED

Ala., Birmingham — Jefferson Co., concrete paving 5 mi. Lock 17 Road, tar and slag paving 2¼ mi. Pumphouse Rd. Convict labor. Est. $80,000.

California—C. H. Purcell, comr. State Hy. Comn., Sacramento, grading 12.5 mi. road between Piru Creek and Gorman, Los Angeles Co., to Morrison & Knudson, Boise City, Idaho and Financial Center Bldg., San Francisco, $495,722. Noted June 25.

California — State Hy. Comn., Sacramento, grading 7.4 mi. Orange Hill-Pain Flat Rd., Mariposa Co., to Frederickson & Watson, and Frederickson Bros., 354 Hobart St., Oakland, $91,311 — bituminous surfacing 7 mi. Mays-Eagle Falls Rd., El Dorado Co., to Force Constr. Co., Piedmont, $37,051—8.6 mi. Riverton-Kyburz Rd., El Dorado Co., to Tiffany, McReynolds & Tiffany, San Jose, $33,792—grading, concrete and asphaltic concrete surfacing 1.4 mi. Coyote Creek-San Jose Rd., Santa Clara Co., to Union Paving Co., Call Bldg., San Francisco, $62,426—grading, surfacing road from west boundary to Toll House, Nevada Co., to Hemstreet & Bell, Marysville, $90,792. Grand total $315,372.

Calif., Culver City—City Council, grading, curbing, guttering, sidewalks, 2 in warrenite (granular) on 4 in. asphaltic concrete paving Zanja Ave., et al., to Griffith Co., Los Angeles Railway Exch. Bldg., $306,689.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, curbing, guttering, sidewalks, storm drains, sanitary sewers, concrete and asphaltic concrete paving 3rd St. from Figurroa St. to Vermont Ave., to Los Angeles Paving Co., Inc., 3200 East Vermont Ave., $333,015.

Conn., Meriden—Bituminous macadam paving 9 streets, to Lane Constr. Co., 37 Colony St., $120,281. Noted July 16.

Ill., Oquawka—Bd. Comrs. Henderson Co., grading, curbing, sidewalks, asphaltic concrete paving Allensandro St., between Riverside Dr. and Glendale Blvd., to J. A. Thompson, 818 Financial Center Bldg., $43,610.

Ind., Ft. Wayne—Bd. Aviation Comrs., concrete paving 1,550 ft. No. 1 Taxi-Way, 50 ft. and asphaltic macadam or concrete paving 2,000 ft. No. 2 Taxi-Way, 100 ft. Paul Beer Field at Municipal Airport, black top runways, to Brooks Constr. Co., 1123 Barthold St., $22,938; concrete and drainage, to Ray Harris Constr. Co., State Rd., $10,679.

Ind., Indianapolis—City Council, grading, 8 in. concrete paving 17,400 sq.yd. East Michigan St. and grading, sheet asphalt paving 4,286 sq.yd. 30th St. from Meridian St. to Capitol, to Standard Paving Co., 1100 Bardsall Blvd., $19,059 and $10,692 respectively, est. $30,271 and $20,588 respectively—grading, 8 in. concrete 3,622 sq.yd. East Michigan St. from State to Randolph to Tacoma Sts., to W. D. Vogel, Inland Bank Bldg., $6,557 and $17,057 respectively, est. $10,204 and $26,653 respectively. Grand total $53,365.

Ind., Indianapolis—City Council, grading drainage structures, concrete paving 23,700 sq.yds. Emerson Ave., to Abel Bros., 1501 South Senate St., $19,764.

Kansas—State Hy. Comn., Court House, McPherson, to Blue Rapids Gravel Co., Blue Rapids, bituminous blotter treating 7 mi. road in Mitchell Co. $5,600, 8.2 mi. Project 14-22, Kansas Project 1175, $6,560, 8.2 mi. Project 14-23, Kansas Project 1176, $6,560, both Jewell Co.—to Reed & Wheelock, Clay Center, 12.5 mi. Project 15-20, Kansas Project 7470, $4,000, 16.85 mi. Project 15-19, Kansas Project 7471, $5,224, both Clay Co.—to W. D. Shay, McPherson, sand gravel surfacing 15.8 mi. Project 50N-18, Kansas Project 7469, McPherson Co., $5,372, to Cook & Cone, Ottawa, oil surfacing same road $6,386. Grand total $39,702. Noted July 9.

Louisiana—State Hy. Comn., Baton Rouge, grading, drainage structures 14.7 mi. road in St. Landry and Porte Coupee Parishes, to Guage Constr. Co., Memphis, Tenn., $271,735. Noted May 14.

Maryland — State Roads Comn., Baltimore, G. C. Uhl, chn., penetration macadam resurfacing 2.13 mi. Contr. C1-98-511 Carroll Co., to T. E. Russell, Frederick, $9,853; macadam paving 0.83 mi. Contr. H-125-42, Harford Co., to T. P. Murray, Towson, $15,315. Noted July 9.

Maryland — State Roads Comn., G. C. Uhl, chn., Baltimore, gravel surfacing 2.34 mi. Contr. C-49-82 Calvert Co., to H. W. Kaylor, Hagerstown, $19,155. Noted July 2.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, graveling 0.95 mi. Contr. C-52-84, Calvert Co., to Jarboe & Haughton, Mechanicsville, $17,382—macadam paving 0.31 mi. Contr. H-133-44, and 1.69 mi. Contr. H-127-44, Harford Co., to T. B. Gatch & Sons, Belair Rd., Raspeburg, Baltimore, $8,822 and $27,895 respectively. Grand total $54,099. Noted July 30.

Maryland — State Roads Comn., G. C. Uhl, chn., Baltimore, graveling 1.86 mi. Contr. C-47-82, Calvert Co., to Jarboe & Haughton, Mechanicsville, $22,951—concrete shoulders on 2.9 mi. Contr. Wi-81-111, Wicomico Co., to Layfield & Waller Paving Co., Salisbury, $16,312—macadam paving 0.75 mi. Contr. H132-42, Harford Co., to T. Murray, Towson, $11,253. Grand total $50,516. Noted July 23.

Md., Baltimore—Bd. Awards, concrete paving 20,000 cu.yd. footways listed in Footway Contr. 121, to P. Averza, 104 North Highland Ave., $27,845.

Massachusetts—Dpt. P. Wks., State House, Boston, A. W. Dean, engr., bituminous macadam paving 27,162 ft. hy., incl. steel deck girder bridge over Falls River, Gill and Greenfield, to A. J. Savin Co., 408 Main St., Hartford, Conn., $350,997, bituilthic concrete paving 6,150 ft. Barnstable to Lane Constr. Corp., 35 Colony St., Meriden, Conn., $22,564. Noted July 16.

Massachusetts—Dpt. P. Wks., State House, Boston, A. W. Dean, engr., rein.-con. and bituminous macadam paving 26,944 ft. hy., in Rehoboth, SeeKonk and Swansea, to Sherry Constr. Co., Inc., 837 Davol St., Fall River, $183,930—rein.-con. hy. incl. steel stringer and rein.-con. bridges, Auburn and Worcester, to Carlo Bianchi, Framingham, $368,251. Noted July 23.

Mass., Medford—Office of Mayor, sheet asphalt paving streets, to A. G. Tomasello, Inc., 250 Stuart St., $56,671.

Mass., Newton—City, P. Wks. Dpt., grading, landscaping Commonwealth Ave., Homer and Walnut Sts., to J. Chesarone, 915 Chestnut St., Newton Centre, $58,000; rough grading, to R. White, Cherry Pl., West Newton, $28,000. Noted July 9.

Minnesota—State Hy. Dpt., St. Paul, grading, shoulders, 1.2 mi. S.P. 3-24, to O'Malley & Trybom, Finley & Danielson, 509 Globe Bldg., Minneapolis, $27,822—5.3 mi. S.P. 7-43 and S.P. 59-27, Sect. 1, to Thoreen, Sandin & Sutton, Stillwater, $29,528—14.3 mi. S.P. 9-45, Sect. 2, to J. Brown, Madison Lake, $74,423—24.5 mi. S.P. 11-32, to Lobnitz Bros., Willmar, $120,543—24.5 mi. S.P. 11-42, to J. P. O'Neil, Faribault, $46,067—9 mi. S.P. 28-32, to De-Ruyter Bros., Willmar, $44,928—19.5 mi. S.P. 9-23, to Park Transfer Co., 1405 11th Ave. S., Minneapolis, $55,579—13 mi. S.P. 9-40, Sect. 1, to C. F. Scully Equipment Co., Dakota Bldg., St. Paul, $26,823 — 12.2 mi. S.P. 10-22, to Angrimson Constr. Co., Milan, $29,568. Grand total $455,281. Noted July 23.

Mo., Clayton—St. Louis County Court, grading, drainage structures, rein.-con. surfacing 2,137 ft. Delaware Ave. and 5,700 ft. Airport Rd., to J. McMahon, Buder Bldg., St. Louis, $16,421 and $31,491 respectively—1,740 ft. Forsythe Blvd., to Creech Constr. Co., 4150 Bingham Ave., St. Louis, $14,735—5,407 ft. Dougherty Ferry Rd., to Skrainka Constr. Co., Security Bldg., St. Louis, $62,825—4 x 6 ft. rein.-con. culvert on Clayton Rd., to J. Dillon, Tennessee Ave., St. Louis, $1,568. Grand total $127,035.

Mo., Clayton—St. Louis Co., Court House, grading, gravel surfacing Keefer Creek Rd., to J. L. Peterson, Valley Park, $2,113—grading, rein.-con. surfacing 6,150 ft. Jennings Station Rd. and 2,324 ft. Etzel Ave., to J. F. McMahon Constr. Co., Buder Bldg., St. Louis, $54,150 and $22,888 respectively. Grand total $79,151. Noted July 16.

Mo., Independence—Jackson Co. Comrs., grading, drainage structures, paving Silby Rd. (Oak Grove Extension), to E. D. Tyner Constr. Co., 14th and Elmwood Sts., Kansas City, $25,588—8.484 mi. Hy. 50-Grain Valley Rd., to C. H. Atkinson Paving Co., Watertown, S. D., $302,124—10.893 mi. Calborn Rd., to A. A. Davis Co., Cotton-Grain Exch. Bldg., Oklahoma City, $33,890—1.010 mi. Oak Grove Rd. and 63rd St. Project 41, to W. A. Ross Constr. Co., Northwest 25th and Summit Sts., Kansas City, $21,217 and $91,675 respectively. Grand total $675,494. Noted July 16.

Mo., St. Louis—Bd. Supervs., City Hall, recut granite gutters, asphalt paving 23,560 sq.yd. Gravois Ave., to Trinidad Asphalt Mfg. Co., 600 South Theresa Ave., St. Louis, $160,686; 17,270 sq.yd. Gravois Ave., to Bridges Asphalt Paving Co., 1411 Central Industrial St., $128,336. Noted June 18.

Mo., St. Louis — Bd. P. Wks., City Hall, widening and recut granite paving 6,100 sq.yd. 7th St., to Perkinson Brothers Constr. Co., 3237 Carter Ave., $43,000—8,260 sq.yd. 12th Blvd., to Chase Constr. Co., 5230 Devonshire Ave., $69,183—vibrolithic concrete paving 4,180 sq. yd. Hickory St., to Eyermann Contg. Co., 1210 South Grand Blvd., $18,423—asphalt concrete paving 1,100 sq.yd. Park Lane and 2,250 sq.yd. Edelle Ave., to Asphalt Paving Co. of St. Louis, $7,420 and $14,858 respectively. Grand total $152,884. Noted July 2.

Montana—State Hy. Comn., Helena, grading 23.079 mi. Pompeys Pillar-Hysham Hy., Yellowstone and Treasure Co., to L. T. Lawler, Butte, $240,298—28.352 mi. Wolf Point-Scobey Hy., Roosevelt Co., to Tomlison-Arkwright Co., Great Falls, $103,635—14.521 mi. Butte-Whitehall Hy., Jefferson Co., to James Crick, Spokane Wash., $231,656—grading and surfacing 8.312 mi. Kalsipell-Pablo Hy., Flathead Co., to Morrison-Knudsen Co., Spokane, Wash., $131,427—paving 0.454 mi. Knowles-Weeksville Hy., Sanders Co., and 23.915 mi. Cascade-Great Falls-Fort Benton Hy., Cascade Co., to McLaughlin Constr. Co., Livingston, $15,590 and $26,261 respectively — oiling 13.209 mi. Butte-Boulder Hy., Jefferson and Silver Bow Counties, to J. C. Maguire, Butte, $28,313—15.092 mi. Bearmouth-Deer Lodge Hy., Powell Co., to Hargrave Constr. Co., Spokane, Wash., $22,573—bridges on Pompeys Pillar-Hysham Hy., Yellowstone and Treasure Counties, to Edw. J. Dunnigan, Inc., St. Paul, Minn., $120,211—bridges on Wolf Point-Scobey Hy., Roosevelt Co., to Boomer & Blakeslee, Great Falls, $17,797—Butte-Whitehall Hy., Jefferson Co., to Ellicott & Nesbitt, Sand Point, Idaho, $5,188—over R.R. crossing on Dillon-Idaho Line Hy., Beaverhead Co., to B. M. Crenshaw, Livingston, $16,999—overhead R.R. crossing on Bridger-Wyoming State Line, Carbon Co., to W. P. Roscoe Co., Billings, $14,102. $974,050.

Nebraska—State Dpt. P. Wks., State House, Lincoln, paving 9.3 mi. Calhoun-Blair and Blair-East Rds., 20 ft., Washington Co., to Western Asphalt Paving Corp., 2100 East 4th St., Sioux City, Ia., $121,394—grading 8.5 mi. Wood-Lake-Valentine Rd. 18 ft., Cherry Co. and oiled sand surfacing 5.4 mi. same road, to Yant Constr. Co., 1140 Omaha Natl. Bank Bldg., Omaha, $35,546 and $30,580 respectively—grading 11.2 mi. Pende-Wathill Rd., 18 ft. Thurston Co., to Moran Constr. Co., 2915 North 16th St., $28,459—6.4 mi. Wood Lake-Valentine Rd., 18 ft., Cherry Co., to Roberts Constr. Co., 404-5 First Natl. Bank Bldg., Lincoln, $28,408—11 mi. St. Paul-Wolback Rd., 18 ft., Howard Co., to G. W. Condon Co., 223 Grain Exch. Bldg., Omaha, $34,016. Grand total $278,403. Noted July 2.

Nevada—State Hy. Comn., Carson City, grading, surfacing 13.83 mi. hy., Eureka Co. to J. N. Tedford, Fallon, $60,066. Est. $70,313.

New Jersey — Bd. Freeholders Sussex Co., County Administration Bldg., Newton, grading, 9 in. rein.-con. paving 3.03 mi. Route 31, Sect. 9, Andover to Newton, to S. B. Martin, Sussex, $151,736. Noted June 18.

New York—A. W. Brandt, comr. Hys., Albany, bituminous and concrete paving 10.43 mi. Schuyler Co. to Stamford Road Constr. Co., Stamford, Conn., $491,700; est. $692,098; and concrete paving 0.436 mi. Schuyler Co., to M. R. Ingraham, Inc., 444 Bway., Albany, $74,874 est. $114,065. Noted June 18 and 25.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., constructing Section 1, Div. 2, elevated ramp from West 22d to 38th Sts., along 12th Ave. to Poirier & McLane Co., 33 West 42nd St., $736,415. Noted July 7.

N. Y., Rochester—Irondequoit Town Bd., asphalt paving St. Paul Blvd., to Whitmore, Rauber & Vicinus, 51 Griffith St., $120,044. Noted July 30.

N. Y., Rochester—Monroe Co., curbing, paving (county share), St. Paul Blvd., to Whitmore, Rauber & Vicinus, 51 Griffith St., $178,616. Noted July 30.

N. Y., St. George—J. A. Lynch, pres. Richmond Boro, Boro Hall, bituminous macadam paving Veltman Ave. to J. E. Donovan, 2205 Richmond Terrace, Port Richmond, $7,594—Evelyn Pl. to Trifoglio, $4,159. Noted July 16.

N. Y., Utica—City, widening and paving Herkimer Rd. to Utica Constr. Co., 622 South St., Utica, $58,487.

Ohio—O. W. Merrell, dir. hys., Columbus, reshaping and bithulithic concrete resurfacing 2.23 mi. hy., Cuyahoga Co. to Roehl Bros. Paving & Constr. Co., 7008 Dennison Ave., Cleveland, $24,890—grading, bithulithic concrete widening 3.021 mi. Butler Co. to Federal Asphalt Paving Co., Hamilton, $28,767—concrete widening 3.015 mi. Fulton Co. to A. J. Baltes, 181 Benedict Ave., Norwalk, $24,952—concrete paving 2.756 mi. Miami Co., to Davis & Davenport Constr. Co., Spencerville, $48,967—0.364 mi. Lucas Co. to McKechnie-Pierce Co., 112 East Woodruff Ave., Toledo, $22,356—brick paving incl. furnishing and delivering brick, 3.18 mi. Butler and Warren Counties, to E. F. Miller Constr. Co., 1343 Lakewood Ave., Lakewood, $111,539—1.319 mi. Sandusky Co. to Modern Constr. Co., Elks Bldg., Fremont, $39,846—smooth old brick paving and tar macadam repairing 0.605 mi. Jackson Co. to N. B. Putnam, Fort Wayne, Ind., $9,788—sheet asphalt paving 0.89 mi. Tuscawaras Co. to Ray Strawser Inc., 852 North Cassady Ave., East Columbus, $28,334—widening and tar macadam paving 4.71 mi. Hancock Co., to L. Cossett, 321 West Front St., Findlay, $35,066. Grand total $374,505. O. W. Merrell, dir. hys., Columbus, cancelled bids received on July 28, widening old macadam road with concrete base and brick surfacing 4.386 mi. Sect. "L" Hanging Rock Ohio River Rd., Lawrence Co., engrs. est. $82,332; concrete paving 2.197 mi. Sect. "T" Cincinnati-Dayton Rd., Hamilton Co., engrs. est. $129,651. Noted July 16.

O., Cleveland—Bd. Comrs. Cuyahoga Co., vitr. brick paving, Chardon Rd. No. 5 from East 200th St. to Neff Rd., to H. G. Herring, 1660 Wayside Rd., $24,661.

O., Columbus—R. S. McPeak, acting service dir., curbing, grading, drainage structures, asphalt paving 1,780 ft. Broadleigh Rd., Broad St. to Fair Ave., to B. F. Patterson, 4476 North High St., $28,792; 2,200 ft. Norwich and Genessee Aves., 6th and Columbus Sts., to Cleveland Trinidad Paving Co., Grand Theatre Bldg., $24,987.

O., Dayton—City Comn., sheet asphalt on concrete paving Patterson Blvd. from Jefferson to Stout Sts., to Republic Asphalt Paving Co., Antioch St., $58,196. Noted July 30.

O., Wellsville—Comrs. Columbiana Co., grading, curbing, concrete paving Clark Ave., to W. J. Ramm, Youngstown, $39,215.

Okla., Oklahoma City—City Council, grading, paving 14 blocks streets in Crown Heights Addition, 26 and 30 ft., to Connelly Bros., El Reno, 355,248.

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Streets and Roads (Continued)

Oregon—State Hy. Comn., Salem, grading 0.57 mi. approaches to Rogue River Bridge, 36 ft., Curry Co., to R. L. Houck, Independence, $27,088; 21.9 mi. Lakeview Hy., 16 ft., Lake Co., to E. McNutt, Eugene, $46,470.

Pennsylvania—State Hy. Dpt., Harrisburg, grading, concrete surfacing 26,000 sq.yd., Route 95, Warren Boro, Warren Co., to J. C. Devine, 243 South Pacific Ave., Pittsburgh, $77,853. Noted June 18.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, concrete surfacing 25,800 sq.yd. Route 243, Sect. 5, Midland Boro, Beaver Co., to Young & Keesecker, Youngstown, O., $101,868. Noted July 2.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, concrete paving Route 302, Sect. 12, St. Clair Twp., Westmoreland Co., to Gray Bros., Youngstown, O., $173,017; grading, waterbound macadam paving 65,523 sq.yd. Route 107, Sect. 6, Rush Twp., Center Co., to A. A. Fugal & E. L. Gronmes, Hollidaysburg, $144,393. Noted June 19.

Pa., Greensburg—J. A. Kelly, clk. Bd. Comrs. Westmoreland Co., rein.-con. paving 21,455 ft. Mt. Pleasant-Scottsdale Rd., Mt. Pleasant Boro and East Huntington Twp., Porter Ave., in Scottsdale Boro and Diamond Ave., in Mt. Pleasant Boro, 18, 20 and 24 ft., to Charles Winter Constr. Co., Butler, $131,000; 2,274 ft. 14th St., in Jeanette and Penn Twps., 18 ft. to P. DeRienzio, Fayette City, $17,000. Noted July 16.

Pa., Phila.—Bureau of Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., to M. Masse, 3936 North Reese St., grading Annsbury and Raymond Sts. from G to Weymouth Sts., and Weymouth St. from Courtland to Annsbury St. $2,133—to Frank Mark Constr. Co., Caster and Winghocking Sts., Champlost St. from Broad to 13th Sts. and 11th St. from Tabor to Clarkson Sts. $551 — to E. Feracco, 3632 North Lawrence St., 54th St. (east side) from city to point 340 ft. of Overbrook, $669 — to Union Paving Co., Broad and Stiles Sts., grading, paving (assessment work) Oxford St. from Comly to Hellerman Sts. $53,693; asphalt paving (assessment work) Front St. from Winghocking St. to summit north $4,518, Hawthorne St. from Hellerman to Levick Sts. $6,372, Indian Queen Lane from Vaux to Henry Sts. $5,383, Musgrave St. from Cliveden to Johnson Sts. $3,350, Pickwick St. from Salmon to Richmond Sts. $1,737, 53rd St. from Berks to Euclid Sts. $2,787, asphalt repaving Christian St. (track area) from 10th to 13th Sts. $3,422, Dauphin St. from 2nd to 3rd Sts. $7,122, Edgemont St. from Somerset to Cambria Sts. $6,296, Pessyunk St. from 19th to Dorrance Sts., 19th St. (track area) from Ritner to Jackson and from Ellsworth to Washington Sts., 20th St. (track area) from Ritner to Passyunk Sts., $18,539, redressed granite block repaving Greens Lane from St. Davids to Silverwood Sts. $8,553, and county road improving Cresco St. from Stanwood to Welsh Sts. $3,220—to Atlas Paving Co., 317 South 6th St., redressed granite block repaving American St. from Callowhill to Willow Sts. $3,148—to United Painting and Constr. Co., 201 North Broad St., cleaning, painting Erie Avenue Bridge $1,764, Oak Lane Bridge $1,333. Grand total $134,590. Noted July 23.

Pa., Pittsburgh—City Council, improving Murdock entrance to Schenley Park, to R. D. Thomas & Co., Jenkins Arcade, $37,837; repaving Center Ave. from Morewood Ave. easterly, to M. O'Herron Co., South 1st & McKean St., $31,183.

Washington — Dir. Hys., Olympia, concrete paving 28,644 sq.yd. State Rd. 6, Spokane Co., to Norris Bros., Burlington, $61,504—State Rd. 1, Snohomish Co., to Templeton & Co., 902 Hoyt Ave., Everett, $7,881—bridge, State Rd. 12, Lewis Co., to Creech Bros. Constr. Co., Aberdeen, $22,392—bridges, State Rd. 9, Grays Harbor Co., to D. Nygren, 309 Lloyd Bldg., Seattle, $37,958. Grand total $129,735.

Wash., Seattle—Kings Co., grading, concrete paving 45,090 sq.yd. Woodinville-Duvall Rd., to Fiorito Bros., 3950 6th St. N. W., Seattle, $128,164. Est. $125,000. Noted July 23.

West Virginia—State Roads Comn., Charleston, **(P. means Project)** improving Projects 3091, 3204 and 3205 Boone Co., to Louisville Oil & Tar Co., Clay St. and River Rd., Louisville, Ky., $20,655—P. 3519 Jefferson Co., to Poffenbarger & Mause, Myersdale, Md., $54,451—P. 190-A McDowell Co., to Hatfield Constr. Co., Huntington, W. Va., $186,966—Projects 159, 160-A and 7993-B Nicholas Co., to R. F. Kirkham & Co., Charleston, $30,045—P. 1054 Wyoming Co., to Brown, Murphy & Wright, Princeton, $99,243. Grand total $391,360. Noted July 23.

Wis., Milwaukee—Dpt. P. Wks., City Hall, to Bodeman Constr. Co., 2803 North 55th St., grading, paving alley between North 70th and 71st St. $2,138; North 29th St. $3,885—to Czerwinski Constr. Co., South 16th and West Morgan Sts., West Windlake Ave. $587; South 34th St. $11,017; West Halt Ave. $3,719; West Hopkins St. $23,941; East Abert Pl., $7,152; South Garden St. $38,439—to Jacobus & Winding, Wauwatosa, North Hawley Rd. $25,256. Grand total $116,134.

Wis., Milwaukee—Dpt. P. Wks., City Hall, to Czerwinski Constr. Co., South 16th and West Morgan Sts., grading, paving East Bradley Ave. $5,777—to Bodemann Constr. Co., 2803 North 55th St., North 21st St., $12,229; North 40th St. $3,116; West Mt. Vernon Ave. $9,989; West Washington St. $17,054—to W. F. Hunt, 757 North Bway., North 35th St. $6,779; West Wells St. $46,666. Grand total $101,610.

Wis., Whitefish Bay—Village Bd., grading 8 in. concrete paving North Lake Dr., South Village Limits to East Silver Springs Dr., to Czerwinski Constr. Co., South 16th and West Morgan Sts., Milwaukee, at $1.34 per sq.yd., total $61,640.

B. C. Vancouver—City, concrete or asphalt paving Granville St. S. and Broadway West, to Vancouver Pile Driving & Contg. Co., Dominion Bank Bldg., $34,879, to Columbia Bithulithic Ltd., Granville Island, $42,042.

Ontario — Toronto and York Roads Comn., 57 Adelaide St. E., Toronto, asphaltic concrete paving 0.6 mi. Contr. 8-31 in Lambton Village to Constructing & Paving Co., Confederation Life Bldg., Toronto—1.3 mi. Contr. 9-31, Wilson Ave., Toronto, northern entrance to Lowes Constr. Co., New Toronto — 1.25 mi. Contr. 10-31, Newmarket to Yonge Sts., to Warren Bituminous Paving Co., 74 University Ave., Toronto, for York County. Est. $60,000.

Ont., Fort William—City, concrete base paving City Rd., $16,000—grading, graveling Cummings St. and Ernestine Ave., $1,148 and $1,105 respectively—sidewalks, wood construction, $20,063 and concrete construction $18,184—concrete curbing, $12,408. Day labor under supervision C. B. Symmes, City Hall, engr.

Ont., Hamilton—City, asphalt paving Robert St. from Cathcart to Emerald Sts.; concrete sidewalks, curbing, Ann and Joseph Sts.; widening pavement on James St. from King St. to Canadian National R.R. bridge. Day labor, $50,000. W. L. McFaul, City Hall, city engr.

Ont., Kingston—Frontenac Co., J. E. Goodman, Court House, engr. grading, ditching, drainage structures, graveling, culverts on county roads. Day labor, $25,000.

Ont., Pembroke—Dpt. Northern Development, Parliament Bldgs., Toronto, grading, preparing and laying retread pavement on Pembroke-North Bay Trunk Rd. from Montgomery's Crossing to Chalk River, to E. Irvine, Alexandria. Est. $75,000. Town, furnishing 20,000 cu.yd. stone.

Ont., Toronto — City, asphalt paving Hilda Ave., to Godson Contg. Co., 203 Richmond St. W., $7,933—Sect. A, Davenport Rd. to McNamara Constr. Co. Ltd., 53 Yonge St., $35,414—Sect. B, Davenport Rd. to Kilmer & Barber, Harbour Bldg., $31,808. Grand total $75,155, asphalt paving Turnberry Ave. and Palmer St., $525 and $1,520 respectively, by day labor, R. C. Harris, City Hall, engr.

Ont., Toronto—City, asphalt paving Banff Rd. and Wanless Ave. to Rayner Constr. Co., 159 Bay St., $7,762 and $5,579 respectively—Servington Crescent, to McNamara Constr. Co., 53 Yonge St., $7,198—concrete paving 4 lanes to Kilmer & Barber, Harbour Bldg., $3,307—2 lanes and 1 lane to Grant Constr. Co., Ltd., 47 Wellington St. E., $3,647 and $717 respectively—3 lanes to L. P. Acri, 28 Grove Ave., $6,241. Grand total $34,451.

Ont., Windsor—Suburban Area Comn., Canada Bldg., J. Miller, secy. plans new concrete roadways. $40,000. Plans to be prepared and work will be done by day labor.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

N. Y., Wantagh—See "Sports and Parks."

Canada—Dominion of Canada, supplementary estimates for fiscal year ending Mar. 31, 1932, as follows: wharf extensions, Seaside, Nova Scotia, $12,000—extending and repairing railway wharf, Chatham, New Brunswick, $10,000 — wharf repairs, Father Point, Grindstone, M. I., dredging, Louisville, extending western breakwater, Matane, wharf, Pointe aux Outardes, protection work, Shawinigan Bay, all in Quebec, $167,000—repairs to approach, Burlington Channel, improving harbor, Godrich, reconstruction wharf, Kingston, Moose Factory, harbor improvements, Owen Sound, Windsor, all in Ontario, $190,800—dredging Maritime Provinces, $50,000, Ontario and Quebec, $75,000, Manitoba, Sask and Alberta, $35,000, British Columbia, $50,000. Grand total $589,800.

BIDS ASKED

Ala., Birmingham — Aug. 20, by A. J. Hawkins, city engr., excavating Sect. 9, Village Creek drainage project, also concrete bridge over Village Creek at 75th St. N.

Ind., Noblesville—Aug. 15, by Bd. Comrs. Hamilton Co., Everett Rohrer Drain in White River Twp., incl. circular catch basin, rectangular catch basins, concrete flume, 2,000' ft. 12 in. and 2,203 ft. 16 in. tile. $27,420. J. S. Shannon, Noblesville, engr.

CONTRACTS AWARDED

Calif., Hilmar—See "Power Plants."

Ind., Valparaiso—Bd. Comrs. Porter Co., improving Joseph M. Dahl Ditch, 30 mi. long, to A. Eckert, San Pierre. Est., $35,000. Noted May 21.

Ia., Sioux City—E. V. Moone, city clk., City Hall, straightening Perry Creek, incl. concrete bridge, sewer extensions, to Jensen & Krage, 1218 Virginia St., $30,141. Noted July 16.

Neb., Lincoln—Lancaster Co. Sanitary Dist. 1, W. C. Frampton, secy., 427 Bankers Life Bldg., deepening, widening Salt Creek in northeast quarter Sect. 7-10-7, incl. 330,849 cu.yd. excav. to Martin Day Co., 312 Little Bldg., $22,829, also another section same project, 290,642 cu.yd. channel excav., 3,430 cu.yd. side ditch excav., 745 cu.yd. levee fill, to same contractor at $0.069 per cu.yd. Noted June 11 and July 16.

Mass., Scituate—Dpt. P. Wks., State House, Boston, concrete seawall in 2 sections North Scituate, to T. J. McCue, 204 North Beacon St., Watertown, $10,875, Humarock Beach, to Atwood-Thomas Constr. Co., 14 Prospect St., Greenfield, $19,415. Noted July 30.

Ont., Lambeth—Westminster Twp., completing Dingman's Creek Drain, involving 125,030 cu.yd. earth excavation to W. E. Lawrence, Mitchell. Est. $26,469.

Bond Elections

Coming Bond Elections

Colorado River Aqueduct, Reservoir, Dam, etc.—Los Angeles, Metropolitan Water Dist., California, Sept. 29, $220,000,000.

Sewer Extensions—Las Vegas, N. M., Aug. 12, $150,000. W. L. Benham, 200 E. 56th St., Kansas City, Mo., Engr.

Sewage Disposal Plant Impvts.—Kent, O., November, $75,000. A. Ranney, City Engr.

Sewers, Water Mains, Street Lighting, Paving, etc., Municipal Improvements Outlying Suburbs — Port Arthur, Tex., Aug. 15, $285,000.

City Hall—Marysville, Calif., $150,000.

School—Dayton, O., (Ebenezer school dist.), November, $170,000.

Bonds Voted

Waterworks System—Waynesville, Mo., $21,000. J. D. Hamel, Springfield, Engr.

Viaduct and Bridge over Neche River—Beaumont, Tex. City's share of cost $900,000.

Indoor Ice Rink and Arena—Lake Placid, N. Y., $150,000.

Bonds Defeated

Water System—Belmont, Calif., $85,000.

Waterworks and Distribution System — Heyworth, Ill., $28,000.

Airport—Ft. Worth, Tex., $100,000.

Police Station and Jail — Ft. Worth, Tex., $250,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Ark., Blytheville—POST OFFICE—Treas. Dpt. at office Sup. Archt., brick, stone, rein.-con., on 140 x 150 ft. site, Bway. and Walnut Sts. $95,000.

Calif., Colusa—WEIR—U. S. Eng., Calif. Fruit Bldg., Sacramento, plans 500 ft. concrete weir at Moulton Landing, Sacramento River. $75,000.

Calif., Richmond Harbor—DREDGING—U. S. Eng. San Francisco, plans dredging 855,680 cu.yd. Richmond Harbor.

Calif., Sunnyvale—HANGAR—Spec. 6631—Yards & Docks, Navy Dpt., 1138 x 310 x 198 ft. hangar at U. S. Naval Air Station.

Conn., Newington—RECREATION—Vet. Bu., Arlington Bldg., rein.-con., brick, terra cotta, recreation building, $170,000. Private plans. Noted Feb. 19.

Conn., New London—POST OFFICE—Treas. Dpt., at office Sup. Archt., U. S. Post Office, Union and Masonic Sts. $300,000.

Fla., Daytona Beach—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by H. M. Griffin, Daytona Beach, U. S. post office. Noted July 2.

Mass., Provincetown—POST OFFICE—Treas. Dpt., at office Sup. Archt., plans 1 story, basement, brick, steel, stone, U. S. post office, Commercial St. $105,000. Noted Dec. 11.

Mass., Rockland—POST OFFICE—Treas. Dpt. at office Sup. Archt., sketches 1 story, basement, brick, steel, Webster and Park Sts. $115,000.

Mo., Jefferson City—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., plans by Klipstein & Rathmann, 316 North 8th St., St. Louis, and E. Swarthwout, 10 East 40th St., New York, post office and federal court building, High and Washington Sts. $450,000. Noted Oct. 30.

N. C., Durham—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Atwood & Weeks, Inc., Chapel Hill, plans U. S. post office.

Okla., El Reno—REFORMATORY—Bureau Federal Prisons, S. Bates, supt., plans by Hawk & Parr, 1019 Hales Bldg., Oklahoma City, 2 story, basement, 50 x 200 ft., rein.-con., brick, steel, terra cotta administration building; 2 story, basement, 161 x 185 ft., rein.-con. mess hall; 2 story, basement, 51 x 232 ft. receiving building 2 mi. west of here. $505,000. Noted Dec. 18.

Okla., Sapulpa—POST OFFICE—Treas. Dpt. at office Sup. Archt., sketches rein.-con., brick post office. $150,000.

Texas—DREDGING—U. S. Eng., Office, Galveston, dredging 8,468,500 cu.yd. in Louisiana and Texas Intracoastal Waterway, Chambers and Galveston Counties. Contingent on rights of way furnished.

Tex., Fort Worth—FEDERAL—Treas. Dpt. at office Sup. Archt., plans federal building, 10th, Lamar and Burnett Sts. $1,215,000. Architect not appointed.

Utah, Jensen — MUSEUM — National Parks c/o Dpt. Interior, plans dinosaur national museum. $200,000.

BIDS ASKED

Ala., Mobile—GENERATING PLANT—Aug. 31, by U. S. Eng., directed connected diesel electric generating plant, complete; adv. E. N.-R. Aug. 12.

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Federal Government (Continued)

D. C., Wash.—EXCAVATION—Aug. 20, by Treas. Dpt. at office Sup. Archt., preliminary excavation for Archives Building; adv. E.N.-R. Aug. 13.

D. C., Wash.—WOOD-WORKING MACHINERY—Aug. 14, by A. L. Flint, general purch. agent, Panama Canal, wood-working machinery, lathe chuck, staybolt iron, spring steel, brass rods, yellow metal, silver soder, etc. Schedule 2674.

D. C., Wash—WAREHOUSE—Aug. 28, at office P. Bldg. & Parks, 7 story, basement, 212 x 252 ft., rein.-con. warehouse; adv. E. N.-R. Aug. 13.

Fla., Key West—BREAKWATER—Spec. 6533—Aug. 12, by Yards & Docks, Navy Dpt., improving breakwater.

Idaho—EARTHWORK—Sept. 16, Bu. Reclamation, by Dpt. Interior, P. W. Dent, acting comr., Burley, earthwork and structures, Milner-Gooding Canal, and earthwork North Gooding Canal enlargement, Gooding Div., Minidoka Project; adv. E. N.-R. Aug. 12.

Ill., Joliet—WALLS—Aug. 25, by U. S. Eng., 1st Chicago Dist., 333 North Michigan Ave., Chicago, completing unfinished work at Brandon Road Pool, consisting concrete masonry walls, through here on Des Plaines River; adv. E.N.-R. Aug. 13. Noted July 23.

Ky., Louisville—ROCK REMOVAL—Aug. 14, by U. S. Eng. P. O. Box 72, Louisville, 14,500 cu.yd. rock and 1,000 cu.yd. mud removal from lower approach to Auxiliary Lock at Dam 41, Ohio River. Noted Aug. 6 Daily.

La., New Orleans—EARTHWORK—Aug. 25, by U. S. Eng., foot Prytania St., 860,000 cu.yd. earthwork, 2nd New Orleans Levee Dist.

Md., Baltimore—SEWERS—Sept. 2, by Treas. Dpt. at office Sup. Archt., sewers at U. S. Immigration Station; adv. E. N.-R. Aug. 13.

Mich., Selfridge Field—BOILER HOUSES—Aug. 27, by Con. Q.M. boiler house. $60,000.

Mo., Missouri City—CLUMP DIKES—Aug. 15, by U. S. Eng., Postal Telegraph Bldg., Kansas City, 3,300 lin.ft. standard pile clump dikes, in Missouri River at Jackson's and Missouri City Bends, 1 mi. from here.

N. Y., West Point—BARRACKS—Aug. 27, at office Con. Q. M., constructing band barracks, married musicians' section; adv. E. N.-R. Aug. 13.

O., Chillicothe—PORCHES, etc.—Aug. 25, by Vet. Bu., Arlington Bldg., porches and altering Buildings 2, 3, 4, and 6, incl. walks, grading, drainage.

Okla., Hobart—POST OFFICE—Aug. 25, by Treas. Dpt. at office Sup. Archt., U. S. Post Office. Noted Feb. 5.

Pa., Kittanning—DREDGING—Aug. 31, by U. S. Eng., Keenan Bldg., Pittsburgh, 124,090 cu.yd. sand and gravel in Allegheny River, below side Kittanning Bridge.

Pa., Middletown—BOILER HOUSE—Aug. 28, by Con. Q. M., boiler house and pipe tunnel.

Pa., Pittsburgh—NEEDLE FLAT—Aug. 27, by U. S. Eng. Office, one 12 ft. x 48 ft. x 3 in. 2 in. wood needle flat; adv. E. N.-R. Aug. 13.

Tenn., Memphis—DREDGING—Aug. 18, by U. S. Eng., McCall Bldg., 1,045,000 cu.yd. earthwork in White River Levee Dist.

Texas and Louisiana—DREDGING—Aug. 24, by U. S. Eng., Galveston, Tex., dredging 37,000 cu.yd. entrance channel from Sabine Lake into Johnson's Bayou.

Tex., Fort Sam Houston—SHOPS—Aug. 24, by Con. Q.M., 1 story, 447x560 ft. engineering shop, 1 story, 66x260 ft. dope house, 66x260 ft. dope storage house and 10x50 ft. boiler house, at Duncan Field. $440,000.

Utah, Coalville—DAM—Aug. 20, by Bureau Reclamation, Denver, Colo., parapet wall and curb, also surfacing crest of Echo Dam of Salt Lake Reclamation Project.

Utah, Idaho and Oregon—LANDING FIELDS—U. S. Airways, Dpt. Commerce, Boston Bldg., Salt Lake City, Utah, taking bids constructing landing fields and 22 x 28 ft. house at Locomolive Springs, Utah; Jerome Mountain Home and Weiser, Idaho and Mecham, Oregon, on Salt Lake-Pasco Air Line.

Virginia—WATER SUPPLY — Aug. 27, by Dpt. Agriculture, Bu. P. Rds., water supply at terminus Mount Vernon Hy., Fairfax Co. near entrance to Mount Vernon Estate; adv. E.N.-R. Aug. 13.

Washington—TURBINE, etc.—Sept. 11, by Bu. Reclamation, Dpt. Interior, Denver, Colo., turbine, generators, switches, pumps, etc. for Prosser Power Plant, and Kennewich Highland Pumping plant, Yakima Project; adv. E. N.-R. Aug. 12.

Wash., Metaline Falls—INSPECTION STATION—Sept. 11, by Treas. Dpt. at office Sup. Archt., constructing U. S. inspection station, here; adv. E. N.-R. Aug. 12.

Wash., Walla Walla—SUBSISTENCE BUILDING—Aug. 25, by Vet. Bur., Arlington Bldg., Wash., D. C., subsistence building, connecting corridors, incinerator, laundry addition, and attendant's quarters, roads and drainage at U. S. Veterans' Hospital.

Wis., Milwaukee—BARRACKS—Sept. 1, by Veterans Bur., Arlington Bldg., barracks and dining hall, incl. roads, walks, etc., at U. S. Veterans Hospital.

Wyoming—ROAD—Aug. 14, by Bu. P. Rds., Denver, Colo., grading, surfacing 4.278 mi Moran-Pilgrim Creek, Section of South Boundary approach road, to Yellowstone Natl. Park, Teton Co. A. E. Palen, Denver, Colo., dist. engr.

T. H., Fort Shafter — SEWAGE PUMPING PLANT—Aug. 25, by Con. Q.M., sewage pumping plant and repairing and additions to sewage system.

CONTRACTS AWARDED

Arizona—ROAD—Bu. P. Rds., Phoenix, grading 6.432 mi. Pine-Winslow Natl. Forest, Rd., Coconino Co., to R. S. Black, Clifton. $40,942. Noted July 23.

Calif., Meridian—WEIR REPAIRS—U. S. Eng., Calif., Fruit Bldg., Sacramento, repairing, concrete work and steel sheet piling, to Tisdale Weir, 8 mi. south of here. $35,000.

Connecticut—DREDGING—U. S. Eng., Providence, R. I., 95,000 cu.yd. material from Stamford and Greenwich Harbors, Stamford, to Bridgeport Dredge & Dock Co., 1024 Main St., Bridgeport. $16,821; Greenwich, to Tremount Dredging Co., 10 State St., Boston, Mass., $14,000. Noted July 9.

Conn., New London—FLOOD LIGHTING—Coast Guard, flood lighting over stadium, to Philip Hass Electric Co., 1029 Main St., Hartford. $6,840. Noted July 16.

Idaho—ROAD—Bu. P. Rds., Ogden, Utah, 7.062 mi. Elk, City Hy., Nez Prince Natl. Forest, Idaho Co., to O. Bundy, Ogden, Utah, $92,224. Noted July 20.

Ia., Atlantic—REMODELING—Treas. Dpt. at office Sup. Archt., remodeling 1 story, 26 x 50 ft., brick, steel, stone post office, to Wickes Eng. & Constr. Co., 1441 Bluff St., Des Moines, $14,490. Noted June 25.

Mo., Miami—CLUMP DIKES—U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 3,692 ft. standard pile column dikes and 4,950 ft. standard revetment in Missouri River at Teteseau Bend to Bilhorn, Bowers & Peters, Inc., 1811 Railway Exchange Bldg., St. Louis, $106,353.

Mo., St. Louis—REVETMENT—U. S. Eng., constructing 1,500 to 3,500 lin.ft. revetment in Mississippi River in Burnham Island and 1,500 to 3,500 ft. at Osborne Field to Woods Constr. Co., 132 South 13th St., Lincoln, Neb., $80,188. Noted July 9;

Mo., Unionville—POST OFFICE—Treas. Dpt. at office Sup. Archt., 2 story, basement, 56x74 ft., rein.-con., brick, stone, post office, to J. M. McHugh & Sons, Inc., 840 West 70th St., Chicago, Ill., $44,985. Noted June 11.

Ore., Baker—DAM—Dpt. Interior, Nyssa, constructing Thief River Valley Dam, Baker Project to Idaho Construction Co., Boise, Idaho, $67,835. Noted July 9.

R. I., Newport—ELEVATOR—Spec. 6519—Yards & Docks, Navy Dpt., elevator at Naval Torpedo Station, Goat Island, to Portland Elevator Co., 133 Oliver St., Boston, Mass., $3,610. Noted June 4.

R. I., Providence—ROCK REMOVAL—U. S. Eng., 830 cu.yd. rock removal in Providence Harbor to Bridgeport Dredge & Dock Co., 1024 Main St., Bridgeport, Conn., $50,000. Noted June 11.

Tennessee and Mississippi—PILE DIKES—U. S. Eng., McCall Bldg., Memphis, Tenn., 5,700 lin.ft. pile dikes below Island 345, to Woods Bros. Constr. Co., 132 South 13th St., Lincoln, Neb., $71,115; 3,800 lin.ft. head of President's Island, and 4,800 lin.ft. above Island 63 to Patton-Tully Transportation Co., Memphis, $66,227 and $117,246 respectively. Grand total $254,588. Noted July 30.

Tex., Galveston—DREDGING—U. S. Eng., dredging in Cedar Bayou Channel to Gulf Coast Dredging Co., 2311½ Avenue C, Galveston, $29,295.

Tex., Houston—DREDGING—U. S. Eng., Galveston, dredging in Houston Ship Channel, to Sternberg Dredging Co., Arcade Bldg., St. Louis, Mo., $42,666. Noted June 25.

Vt., Rutland—POST OFFICE—Treas. Dpt. at office Sup. Archt., heating and plumbing for U. S. post office to Mechanical Plumbing & Heating Co., 55 Exchange St., New York. Noted July 9.

Washington—ROAD—Bu. P. Rds., Post Office Bldg., Portland, Ore., grading, trestling 0.45 mi. Yakima Hy., Lewis Co., to C. R. Johnson, Portland, Ore., $44,321.

Wash., Seattle—FEDERAL—Treas. Dpt. at office Sup. Archt., federal building, to Murch Bros. Constr. Co., Railway Exch. Bldg., St. Louis, Mo., $1,294,000. Noted Aug. 8.

Wyoming—ROAD—Bu. P. Rds., Denver, Colo., grading, draining 13.597 mi. Tower Falls Frog of Grand Loop Natl. Park Hy., Yellowstone Natl. Park, to S. J. Groves & Sons, 529 South 7th St., Minneapolis, Minn., $317,242.

W. Va., Huntington—HEATING—U. S. Vet. Bur., Arlington Bldg., heating and electrical work to Redmond Heating Co., 124 North 4th St., Louisville, Ky., $216,031.

GRADE CROSSINGS

PROPOSED WORK

N. Y., LeRoy—Buffalo, Rochester & Pittsburgh Ry., E. F. Robinson, ch. engr., Rochester, plans eliminating West Main Street crossing. $229,955.

Pa., Washington—Baltimore & Ohio R.R. Co., Baltimore, Md., H. A. Lane, ch. engr., subway under tracks over National Pike, eliminating grade crossing, also relocating tracks. $250,000.

Tex., San Antonio—City, Southern Pacific Ry., Co., G. W. Boschke, San Francisco, Calif., (ch. engr. (Pacific Lines), San Antonio, Aransas Pass, subsidiary Texas & New Orleans R.R. Co., R. W. Barnes, Houston, ch. engr., Southern Pacific Lines in Texas and Louisiana; Missouri Pacific Ry., E. A. Hadley, St. Louis, Mo., ch. engr. and Missouri, Kansas & Texas Ry of Texas, F. Ringer, Dallas, ch. engr., plan eliminating 16 railroad crossings, and constructing viaducts and underpasses in business district. $700,000 Address I. Ewig, City Hall, city engr., at present.

Ont., Burlington—Canadian Natl. Ry., T. T. Irving, ch. engr. Central Region, Toronto, Ont., plan concrete, rein.-con. or concrete and structural steel subway under railroad tracks, Plains Rd. $200,000.

CONTRACTS AWARDED

N. Y., Aurora—Buffalo, Rochester & Pittsburgh Ry., E. F. Robinson, ch. engr., eliminating Loveland Road Crossing, on Orchard Park-Griffin Mills County Hy., Erie Co., to A. A. Howard, Warsaw, $49,770, est. $84,642.

N. Y., Wantagh—Long Island State Park Comn., Babylon, and Long Island R.R. Co., A. C. Watson, ch. engr., Pennsylvania Sta., New York, grade separation of railroad and Wantagh Spur Parkway, to Foley Bros., 9400 168th St., Jamaica. $96,690.

Wisconsin—State Hy. Comn. and Unemployment Comn., Madison, Marengo Overhead, Ashland Co., and Elk Mound Overhead, Dunn Co., to L. G. Arnold, Eau Claire, $9,830 and $11,511 respectively—Lawrence Underpass, Brown Co., to Cherney Constr. Co., Francis Creek, $26,620—Amherst Overhead, Portage Co., to C. G. Wussow, 2737 North 39th St., Milwaukee, $27,260—Mellon-Ashland Rd., Ashland Co., to Fitzpatrick & Kuenzli, Cumberland, $18,340 — Pittsville Overhead, Wood Co., to Rapids Constr. Co., Wisconsin Rapids, $24,156—Random Lake Overhead, Sheboygan Co., to Appleton Constr. Co., Appleton, $24,488—West Oakdale Overhead, Monroe Co., to Eau Claire Eng. Co., Eau Claire, $45,570—North Tomah Overhead, Monroe Co., to Burch Constr. Co., Madison, $39,115—Port Washington Horican Fox Lake Rd., Sect. 1 and 2, to Marchese Bros., Milwaukee, $64,532 and $73,133 respectively—approaches to Clarence Bridge, Green Co., to J. L. Frame, Blue Mound, $10,263. Grand total $374,824. Noted July 24 Daily.

DAMS

BIDS ASKED

Pa., Jamestown—See "Waterworks."

CONTRACTS AWARDED

Calif., San Francisco—See "Waterworks."

PIERS AND WHARVES

PROPOSED WORK

Calif., Bay Point—See "Warehouses."

N. J., Brielle—H. F. Hoffman, Brielle, 100 ft. and 150 ft. timber piers, and 320 ft. timber bulkheads on Manasquan River. $25,000. Project postponed indefinitely. G. R. Moore, 603 Harrison Ave., Asbury Park, engr. Noted June 25.

N. Y., East Greenbush — Sun Oil Co., 1608 Walnut St., Phila., Pa. pier and warehouse. $200,000. **Maturity in winter.** Noted Jan. 1.

R. I., Providence—S. E. Winson, chn. Harbor Comn., received no bids July 29, 2 story, wharf, structure and pier shed waterfront. State pier, wharf and warehouse. Est. exceeds $25,000. P. Sarle, 95 Fountain St., engr. Noted July 16.

CONTRACTS AWARDED

N. J., Edgewater—PIER, etc.—Lever Bros. Co., Hudson River Terminal, will build timber and concrete pier, and dredger on Hudson River, separate contracts. $25,000 or more. Stone & Walker, 49 Federal St., Boston, Mass., engrs.

AIRPORTS

PROPOSED WORK

Conn., Hartford—Hartford Aviation Comn., Chamber of Commerce, plans 2 story 60 x 65 ft. airport terminal at Brainard Field. $45,000. I. A. Allen & Son, Inc., 100 Farmington Ave., engr. Noted Dec. 11.

Mo., Kansas City—City Council, plans by A. H. Gentry, Fairfax Bldg., 1 story, 120 x 400 ft. to 50 x 400 ft. 2 story, rein.-con., brick, steel hangar and office Municipal Field. $250,000.

Mo., Kansas City—Trans-Continental & Western Airport Corp., Inc., c/o J. L. Maddux, sketches by A. H. Gentry, Fairfax Bldg., 1 story 120 x 400 ft., concrete, brick, steel hangar at Municipal Airport. $100,000.

Tex., Dallas—United Air Line, Dallas, soon takes bids, new hangar at Love Field. $100,000. A. Epstein, 2001 Pershing Rd., Chicago, Ill., engr.

Ont., Toronto—City, plans civic airport, in northwestern dist., incl. runways, buildings, etc. $250,000. R. C. Harris, City Hall, engr.

GRAIN ELEVATORS

PROPOSED WORK

Ia., Sioux City—GRAIN ELEVATORS—Terminal Grain Corp., S. P. Mason, pres., Grain Exch. Bldg., preliminary plans 500,000 bu. capacity rein.-con. addition, 14th and Division Sts.

CONTRACTS AWARDED

Minn., Minneapolis—GRAIN ELEVATOR—Archer-Daniels-Midland Co., 600 Roanoke Bldg., 54 x 83 x 200 ft. metal grain tanks, 611-25 Malcom Ave. S. E., to H. J. Asleson, 526 Sexton Bldg., $120,000.

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Grain Elevators (Continued)

Neb., Omaha—GRAIN ELEVATOR—Meney Milling Co., H. K. Schafer, 2463 South 27th St., rein.-con., 28th and Oak St., to Fegles Constr. Co., 711 Wesley Temple Bldg., Minneapolis, Minn. Est. $50,000.

POWER AND LIGHTING

PROPOSED WORK

S. D., Sioux Falls—Sioux Falls Gas Co., laying gas mains, constructing storage tanks, regulator stations, equipment to change from manufactured to natural gas system. $200,000. Engineering Dpt. Missouri Valley Pipe Line Co., Omaha, Neb., engrs.

BIDS ASKED

New York—Aug. 18, by J. J. Dorman, fire comr., Fire Dpt., Municipal Bldg, New York, portion underground fire alarm system, Northern Blvd. Impvt. Queens Boro; and portion underground fire alarm system (post Manhole and conduit installation, Bronx Boro.

N. Y., Batavia—Sept. 3, by Superintendent Div. Standards & Purchase, Executive Dpt., Capitol, Albany, electric service connections to new dormitory building, at New York State School for Blind; adv. E. N.-R. Aug. 13.

N. Y., Brooklyn—Aug. 18, by Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, erecting and completing field house, and comfort station, in playground 8, Bay Parkway and West 12th St.

N. Y., New York—Sept. 25, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., furnishing and installing block signalling and interlocking equipment, for a portion of City-owned Rapid Transit R.R. extending from 145th St. to Webster Ave., Manhattan and Bronx Boros.

CONTRACTS AWARDED

Calif., Long Beach—City Council, ornamental lighting system on Long Beach Blvd. between 48th St. and Boxby Rd., to F. Ziebarth, Security Bldg., $28,872.

Illinois—Corporation, c/o Insull Utilities Investment, Inc., 27 West Adams St., Chicago, and Midwest Utilities Co., electric power transmission line from Chicago to Peoria, 2,950 tons steel shapes for power lines, to Blaw-Knox Co., Blaw-Knox Bldg., Pittsburgh, Pa., 1,600 tons, to Gary Structural Steel Co., Gary, Ind., 2,900 tons, to Aeromotive Co., 128 North Wells St., Chicago.

PARKS AND SPORTS

PROPOSED WORK

Calif., North Sacramento—Owner c/o J. C. Peterson, archt., 812 26th St., plans 150 x 200 ft. rein.-con. and tile swimming pool, Parisian type.

Calif., Palo Alto—City Council plans municipal swimming pool, on Bay Frontage, incl. 15,000 cu.yd. slope excav., 28,000 cu.yd. fill, tree planting, bath houses, $25,000 to $30,000. J. F. Byxbee, Jr., city engr.

N. J., Elizabeth—Bd. City Comrs., City Hall, concrete and tile swimming pool, Elmora and Jersey Aves., $25,000. **Maturity in spring 1932.** Engineer not selected. Noted July 23.

N. J., Jersey City—International Stadium Co., C. Ferrai, pres., revised plans rein.-con. stadium, State Hy., Bway. and Dales Ave., $2,500,000. F. W. Mellor, 25 West 45th St., New York, N. Y., archt. This corrects report in July 30 issue.

N. J., Long Branch—Hollywood Beach Club, 1133 Bway., New York, revised plans swimming pool, Ocean Ave. **Maturity indefinite.** H. B. Seymour, 614 McClellan St., engr. Noted June 11.

N. J., Rutherford—Bd. Educ., High School, will not build athletic field adjoining school, $25,000. Project abandoned. Noted May 21.

N. J., Trenton—State Bd. Educ., State House, rein.-con., tile swimming pool at State Teachers College in Hollywood Lakes Sect., $50,000. Project in abeyance, probably mature in November. Div. Archt. & Constr., State House Annex, archt. Noted June 25.

N. Y., Wantagh—Long Island Park Comn., Babylon, beach development and park, incl. dredging channel, landscaping, approach roads, walks, etc., at U. S. Coast Guard Station, $100,000. **Maturity in October.**

Ont., Windsor — City, Parks Comn., plans rein.-con. swimming pool in Jackson's Park, $45,000. R. J. Desmarais, City Hall, engr.

BIDS ASKED

Mass., Boston—Aug. 17, by Dpt. School Buildings, playground shelters in various school grounds, for City.

Mass., Boston—Aug. 21, by Park Dpt., 33 Beacon St., field houses, concrete bleachers, grading, at J. J. Connolly playground, Roxbury and Dunbar Aves., Dorchester. $25,000 or more.

N. Y., Kew Gardens—Aug. 20, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, improving site adjoining playground at P. S. 99, Kew Gardens Rd. and 83rd Ave., for Bd. Educ., 500 Park Ave., New York.

O., Cleveland—Aug. 20, by City, D. E. Morgan, city mgr., two 120 x 240 ft. and 75 x 75 ft. concrete, brick, steel, tile swimming pools East 40th St. $350,000. H. Kregeline, City Hall, archt.

O., Cleveland—Aug. 20, by Bd. Educ., F. G. Hogen, dir., improving grounds for new administration building, incl. landscaping, tree planting, driveways, walks, fence, etc. $50,000. Pitkin & Mott, 3866 Carnegie Ave., engrs.

CONTRACTS AWARDED

Ky., Bowling Green—Western State Teachers College, 60 x 120 ft. rein.-con. swimming pool, 347,000 gal. capacity, underwater flood light lighting, equipped with purification and heating plant, to J. U. Schickle & Bros., 1300 West Oak St., Louisville. Est. exceeds $25,000.

Me., Farmington—Bunker & Savage, archts., 254 Water St., Augusta, gymnasium at State Normal School, for Farmington State Normal School, to P. P. Carey, 40 Main St., Waterville, $22,000. Est. $25,000. Noted July 9.

N. J., Newark—Bd. Educ., City Hall, general contract playground adjoining West Side High School, to T. F. Conroy & Sons, 95 Tiffany Pl., Maplewood; field house, to James Richliano, 105 Clifton Ave. Est. $25,000. F. Bertrand, 222 Market St., engr.

N. Y., Brooklyn—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, grading section Marine Park, to Aviron & Son, Inc., 358 Hart St., $28,040. Noted July 16.

N. Y., New York—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, improving park plots, to Anthony Capasso, 4121 Gunther Ave., $26,753.

N. Y., New York—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, war memorial, Pelham Bay Park, to Monohan & McCann, 325 East 103rd St., $83,000. Noted July 2.

N. Y., New York—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, improving Mosholu Parkway Athletic Field, to Michael DiRoma, 33 Evelyn Pl., $9,566, installing tree guards, Mall Central Park, to J. D. Nugent, 1617 73rd St., Brooklyn, $5,444, installing wading pool, Thomas Jefferson Park, to Guiseppi Vitalgiano, $8,160. Grand total $23,170. Noted July 16.

N. Y., New York—Park Bd. W. R. Herrick, pres., Park Bd., Arsenal Bldg., Central Park, general improvement Franz Seigel Park, Bronx Boro, to Frank Mascali & Son, 645 East Tremont Ave., Bronx, $75,946—construction to Major Contg. Co. $73,480. Noted July 9.

HEATING AND VENTILATING

PROPOSED WORK

Mass., Grafton—Commonwealth of Massachusetts, Dpt. Mental Diseases, Boston, renewing steam lines at State Hospital. $53,000. R. D. Kimball Co., 6 Beacon St., Boston, engrs.

BIDS ASKED

N. J., Lodi—Aug. 19, by Bd. Educ., School 1, repairing, replacing heating, plumbing systems in various schools. $25,000. Private plans.

CONTRACTS AWARDED

Vt., Bennington—State of Vermont, G. H. T. Johnson, Montpelier, general contract, 1 story, brick, steel, concrete central heating plant, to M. J. Burrington, Jr., 495 Main St., $13,722, heating and plumbing, to M. H. McLaughlin, Rutland, $10,620.

UNCLASSIFIED

PROPOSED WORK

Ga., Atlanta—BUS STATION—Southeastern Greyhound Lines, plans by Hentz, Adler & Shutze, 1330 Candler Bldg., 1 story, steel, brick, tile, stucco, concrete found. $40,000.

Ind., Rockville — PLUMBING, ELECTRIC FIXTURES, etc.—Bd. Comrs. Parke Co., plans new sheet metal partitions, plumbing, electric fixtures, new stone entrance to court house, $25,000.

N. J., Highlands — IMPROVING SCHOOL GROUNDS—Bd. Educ., preliminary plans grading, concrete sidewalks, fountains, paving, improving school grounds, $25,000.

N. J., Newark—TERMINAL DEVELOPMENT—Owner, c/o H. W. Ordeman, archt., 28 Harbor View Pl., St. George, N. Y. plans terminal development, at owner property Submarine Boat Corp., Port Newark, $3,500,000.

N. Y., Mount Vernon — FIREMAN'S DRILL TOWER—Dpt. Purchase, plans 65 ft. fireman's drill tower, Canal St. $40,000.

N. Y., Wantagh—BEACH DEVELOPMENT, etc.—See "Sports and Parks."

Tex., Beaumont—SUB-DIVISION DEVELOPMENT—E. C. Hankamer, Sour Lake, and H. E. Alexander, Beaumont, plan developing 300 acre tract for residential development, incl. water, lights, sewers, paving, etc. Private plans.

Tex., Stephensville—GAS PIPE LINE—N. J. Harbin, et al., Stephensville, preparing surveys, constructing 125 mi. probably 8 in. gas pipe line to extend from here to tap Exray gas fields to the north. W. J. Harrison, Stephensville, engr.

BIDS ASKED

Neb., Omaha — SHEEP BARN — See "Contracts Awarded."

N. J., Alpine—LUMBER, etc.—Aug. 24, by Palisades Interstate Park Comn., L. Deyo, purch. agt., 141 Worth St., New York, furnishing, delivering 106,000 ft. B.M. lumber, $5,000 or more; dredging, removing 15,000 cu.yd. at Alpine basin and 15,000 cu.yd. Forest View Basin, $25,000. Private plans.

N. Y., Comstock—ELEVATOR—Sept. 1, by Commissioner Dpt. Correction, State Office Bldg., Albany, electric elevator, storehouse, Great Meadow Prison; adv. E.N.-R. Aug. 13.

N. Y., New York—ELEVATOR—Sept. 1, by Superintendent P. Wks., at office Bd. Trustees, New York State Roosevelt Memorial Museum of Natural History, 15 West 77th St., elevators, for New York State Roosevelt Memorial; adv. E.N.-R. Aug. 12. Noted July 16.

N. Y., New York—SPECIAL WORK—Aug. 18, by Bd. Transportation, J. H. Delaney, ch., 250 Hudson St., supply special work, (rails, frogs and switches) for Rapid Transit Railroads.

Pa., Phila.—BLOCK SIGNALLING and INTERLOCKING—Aug. 25, by Dpt. City Transit, C. E. Myers, dir., City Hall Annex., Contr. 335, automatic block signalling and interlocking for Ridge-8th Street Subway.

CONTRACTS AWARDED

Mo., St. Louis — GASOLINE STATIONS — Phillips Petroleum Co., Bartlesville, Okla., and 1 Wall St., New York, 14 gas service stations, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. exceeds $150,000.

Neb., Omaha—GAS TERMINAL and DISTRIBUTION PLANT—Great Lakes Pipe Line Co., Fairfax Industrial Dist., Kansas City, Kan., Ethyl gas blending plant, one 17,500 bbl. and two 30,000 bbl. capacity tanks, loading racks to accommodate 20 railroad cars, near 5th St. and Illinois Central R.R., to Permanent Constr. Co., 208 South La Salle St., Chicago, Ill.

Neb., Omaha—SHEEP BARN—Union Stock Yards Co., rein.-con. sheep barn, day labor. $75,000. Private plans.

N. J., Trenton—KILN TUNNEL—New Jersey Porcelain Co., Pennsylvania Ave., brick, to Harrop Ceramac Serv. Co., 310 West Broad St., Columbus, O. Est. $35,000.

N. J., West New York—CONCRETE PILES—Bd. Town Comrs., Municipal Bldg., furnishing, driving concrete piles in park between Bway. and Palisade car line to J. Naimo, 688 Monroe Rd., est. $5,000.

N. Y., New York—PLUMBING—Bd. Higher Educ., at office Secretary Hunter College, Park Ave. and 68th St., plumbing for gymnasium building, Hunter College, to J. M. Kandel, 1753 Popham Ave., $57,500; electrical work to J. L. Goodrich, Inc., 205 East 42nd St., $18,490. Heating rejected. Noted July 2.

N. Y., New York—STATION FINISH—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., station finish work in Kingsbridge Rd. and Bedford Park Station, Rapid Transit R.R., to Meads Eng. Co., Inc., 127 West 14th St., $217,100. Noted May 28.

O., Cleveland—STEAM LINE—City, underground steam line on Fairmount Road between Woodhill Rd. and Carnegie Ave., to Becker-Seidel Co., 2341 East 22nd St., $32,622.

Texas—PIPE LINE—Atlantic Refining Co., 260 Broad St., Phila., Pa., furnishing 180 mi. 20¼ in. seamless pipe for pipe line to extend from east Texas fields toward lower coast to National Tube Co., Youngstown, O. Noted Aug. 6.

Tex., Sinco—TUNNEL—Sinclair Pipe Line Co., Sinclair Oil Fields, Tulsa, Okla., and 45 Nassau St., New York, 700 ft. rein.-con. tunnel 10 ft. inside diam., walls 18 ft. thick, 90 ft. deep, channel irons in shafts for anchoring different pipes, for purpose placing pipe lines across channel, to Subway Eng. Co., 115 South Dearborn St., Chicago, Ill., $175,000.

B. C., Vancouver—GAS PLANT—British Columbia Electric Ry. & Gas Co., 425 Carroll St., new gas plant, incl. complete coal and gas unit, wharf, coal handling and blending plant, etc., to Gas Chamber & Coke Ovens, Ltd., London, England. $700,000.

Que., St. Denis—NATURAL GAS DEVELOPMENT—Hope Engineering Co., 149 Bway., New York and Mt. Vernon, O., drilling and series of wells in connection with natural gas development. Day labor and separate contracts. Est. exceeds $100,000.

MATERIALS

PROPOSED WORK

STREET SWEEPER—**San Rafael, Calif.**—City Council purchasing motor street sweeper. H. K. Brainard, city mgr.

BIDS ASKED

CONCRETE—**Modesto, Calif.**—Aug. 24, by C. S. Abbott, secy. of Dist. 15,500 bags portland cement at Woodland Ave., 4,500 bags at Waterford.

COPPER TUBING—**Oakland, Calif.**—Aug. 26, by J. H. Kimball, secy. East Bay Municipal Utility Dist., 512 16th St., 50,000 ft. ¾ in. seamless copper tubing, Spec. LS-59.

STEEL, GRAVEL, etc.—**Galesburg, Ill.**—Aug. 15, by various contractors, 13,793 lb. reinforcing steel, 45,020 lb. structural steel, 194 lin.ft. 15 in. and 520 lin.ft. 12 in. rein.-con. pipe, 9,816 tons road gravel, 1,120 lb. bolts, etc., 373 lb. ¾-in. galvanized rods, 1,454 lin.ft. creosoted piles, 5,810 ft. wire road guard, 1 name plate, for Knox County Hy. Dpt., A. R. Smith, engr.

PIPE—**Boston, Mass.**—Aug. 17, by Supply Dpt., standard wrought iron pipe, to P. Wks. Dpt., P. A. Chapman, supt. $5,000.

PIPING and MACHINERY—**Boston, Mass.**—Aug. 20, by Dpt. P. Wks., piping and machinery for high pressure service pumping station.

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Materials (Continued)

LUMBER—Minneapolis, Minn.—Aug. 19, by Bd. Educ., 125,000 bd. ft. red oak, black walnut red gum and other hardwood lumber. Former bids rejected.

BITUMINOUS MATERIALS—St. Paul, Minn.—Aug. 17, by State Hy. Dpt., furnishing, applying 2,000,000 gal. bituminous materials on state trunk hys.

OIL DISTRIBUTOR—Reno, Nev.—Sept. 5, by E. H. Beemer, clk. Washoe Co., 1,200 gal. capacity B.L.J. road oil distributor with 4 cylinder Model K Le Roi power unit, with clutch, all driving parts installed, 1 B.L.P. retord, 1 Burch Spreader of Pacific design.

PILES—Alpine, N. J.—Aug. 24, by Palisades Interstate Park Comrs., L. Deyo, purch. agt., Worth St., New York, one hundred sixty-one 6 ft. oak piles and fifteen 80 ft. oak piles at Alpine Boat Basin. $5,000. Private plans.

STEAM CINDERS—New York, N. Y.—Aug. 18, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., 25,000 cu.yd. steam cinders.

TRAP ROCK SCREENINGS, etc.—St. George, N. Y.—Aug. 19, by J. A. Lynch, pres. Richmond Boro, Boro Hall; 800 cu.yd. trap rock screenings, to asphalt plant, on Richmond Terrace near Taylor St.; 62,000 gal. asphaltic binder, hot application, on streets; 500 cu.yd. ¾ in. and 200 cu.yd. ¾ in. broken stone chips, in Dist. 1; 1,500 cu.yd. ¾ in. broken stone, 600 cu.yd. ¾ broken stone chips, in Dists. 2 and 3.

WOOD PAVING BLOCKS—New York, N. Y.—Aug. 14, by P. J. Dooling, comr. Purchase, Municipal Bldg., wood paving blocks to Dpt. Plant & Structures.

ALUMINUM SHEETS—Phila., Pa.—Aug. 19, by C. E. Walsh, purch. agt. Pennsylvania R.R. Co., 15 North 32nd St., aluminum sheets, Contr. 22-1931.

CORRUGATED METAL PIPE—Wyoming—Aug. 18, by State Hy. Comn., Capitol Bldg., Cheyenne, corrugated metal pipe, treated timber, treated timber piling, asphalt plank, road oil.

FOREIGN

CONTRACTS AWARDED

COPPER WIRE — Glendale, Calif. — City Council, to General Electric Supply Co., 385 East 2nd St., Los Angeles, 20,000 lb. 2/0 B and S gauge T.B.R.W. med. hard drawn copper wire, at $12.13 cwt., 30,000 lb. T.B.W.P. med. hard drawn, $12.13 cwt., 10,000 lb. 400,000 C. M. Standard, single conductor or 19 strands med. hard drawn, $11.88 cwt.

WATER PIPE — Long Beach, Calif. — City Council, 30,000 ft. 2 in. bell and spigot water pipe, to Pacific States Cast Iron Pipe Co., 417 South Hill St., Los Angeles, at $0.195 per ft.

CAST IRON PIPE—Oakland, Calif.—East Bay Municipal Utility Dist., furnishing 25,000 ft. 8 in. c.i. pipe, to R. D. Wood Co., 400 Chestnut St., Phila., Pa., $16,975; 80,000 ft. 4 in. and 20,000 ft. 2 in. c.i. pipe, to Pacific States Cast Iron Pipe Co., 111 Sutter St., San Francisco, $26,000 and $3,800 respectively; 50,000 ft. 6 in. and furnishing and delivering 12,000 ft. 6 in. c.i. pipe, to United States Pipe & Fdry. Co., Monadnock Bldg., San Francisco, $24,375 and $27,444 respectively; valve operating mechanisms for Lafayette and Walnut Creek Pumping Stations, to State Electric Supply, Ltd., 241 10th St., Oakland, $2,009. Grand total $90,603.

STEEL SHAPES—Illinois—See "Power and Lighting."

GRAVEL — Mississippi — State Hy. Comn., Tower Bldg., Jackson, to J. M. Todd & Co., Corinth, hauling gravel for maintenence purposes in Hy. Dist. 6, $47,780; to B. G. Goggin, Nettleton, Hys. Dist. 1, $19,850; Hys. Dist. 5, $7,950, Hy. Dist. 2, $36,000; to H. G. Graham, Meridian, Hy. Dist. 3, $8,830; to Clark & McCaa, Jackson, Hy. Dist. 7, $18,250. Grand total $138,660. Noted July 16.

ROAD OIL—Ridgewood, N. J.—Bd. Town Comrs., 29 Hudson St., road oil to Lansdell Co., asphaltic oil at $0.1245 per gal.; binder and tar at $0.14 per gal. sand to Samuel Braen & Son, Nelson St., Hawthorne, at $1.25 per cu.yd.

ORE BRIDGE ELECTRIC EQUIPMENT—Braddock, Pa.—Carnegie Steel Co., electrical equipment to be used in new 15 ton ore bridge at Edgar Thompson Wks., to Westinghouse Electric & Mfg. Co., 150 Bway., New York. Est. exceeds $40,000.

STEEL PILING—Beaumont, Tex.—City, 650 lin.ft. 20 ft. steel sheet piling, to Sheet Piling, Inc., 17 John St., New York, N. Y., $30,000. Noted June 25.

EQUIPMENT

BIDS ASKED

BOOSTER PUMP—Beverly Hills, Calif.—Aug. 25, by B. F. Firminger, city clk., booster pump for water department.

TRUCKS, etc.—Beverly Hills, Calif.—Aug. 25, by B. J. Firminger, city clk., one 2½ ton truck for garbage collection; motor truck type water tank for street department.

EQUIPMENT—Glendale, Calif.—Aug. 20, by City Council, furnishing equipment and constructing building for outdoor switching station for public service department.

TRANSFORMERS—Los Angeles, Calif.—Aug. 13, by T. Oughton, city purch. agt., 10 regulating transformers (Spec. 2560) for water and power department.

MACHINE TOOLS, etc.—New York, N. Y.—Aug. 21, by Bd. Transportation, J. H. Delaney, ch., 250 Hudson St., installing machine tools and equipment for 207th Street Shops for Independent system city-owned rapid transit railroads.

BENTWOOD CHAIRS, BOOK CASES, etc.—Cleveland, O.—Aug. 17, by Bd. Educ., furnishing bentwood chairs, bookcases, teachers desks, saddle seat chairs, tablet arm chairs, stool, tables, cupboards, benches, miscellaneous cabinet work for 3 new high schools.

Foreign

Chile—Dpt. P. Wks., Santiago, Trans Andean Railroad from Antofogasta, Chile, to Salta, Argentine, $12,000,000. Project in abeyance. Noted Dec. 25.

Mexico, Matamoras—Mexican Govt., Mexico City, plans 3 rein-con., steel, bridges on Matamoras-Victoria Hy. over Purification, San Fernando and Corona Rivers. $600,000. G. Francisco Castellanos, Jr., c/o Eng. Dpt., Tamaulipas, engr.

New Zealand, Wellington—Oct. 20, by Ministry of P. Wks., supplying boosting transformers.

South Africa, Johannesburg—Metro-Goldwyn-Mayer Corp., 630 9th Ave., New York, takes bids in October general contract theater. $700,000. T. W. Lamb, 570 7th Ave., New York, archt. Noted July 30.

South Africa, Pretoria—Sept. 18, by City Council, supplying switchgear and auxiliary apparatus in connection with installation two 12,500 kw. 3 phase turbo-alternators.

Commercial Buildings

RESIDENTIAL

BID ASKED

Calif., Los Angeles—Zoeblin Co., 3801 South Grand St., taking bids from selected list of contractors 13 story, basement, apartment and store, 200 ft. frontage, Santa Barbara and Figuero Sts. $250,000. C. J. Weyl, 6536 Sunset Blvd., archt.

Mass., Brighton (sta. Boston)—See "Contract Awarded."

Neb., Lincoln—Martin Investment Co., M St., plans by J. R. Smith & Son, 138 North 12th St., probably take bids late in August, 5 story, basement, rein.-con., brick apartment, M St. between 12th and 13th Sts. $150,000.

N. Y., Bayside—See "Contracts Awarded."

N. Y., Long Island City—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

Pa., Phila.—J. E. Fieldstein, archt., Otis Bldg., soon lets contract, 8 story, basement, 56 x 137 ft., rein.-con., brick, steel, plain found., 231 West Tulpehocken St., for Kenwood Development Co., 240 West Washington Lane.

CONTRACTS AWARDED

Calif., San Francisco — J. Exnicios, 135 Darien Way, 6 story, basement, steel, concrete, to Mission Concrete Co., 270 Turk St., $160,000. Noted Apr. 30, under "Contracts Awarded."

Mass., Brighton (sta. Boston)—Chiswick Park Realty Trust, 1800 Commonwealth Ave., Boston, 2 units, 3 story, basement, brick, steel, stone, plain found., 66-70 Chiswick Rd., separate contracts. $200,000. S. E. Moffie, 10 Tremont St., Boston, archt.

Mass., Lynn — Hotel Lenox Inc., V. M. Kavanaugh, pres., general contract 4 story, basement, 90 x 140 ft., brick, steel hotel, Broad and Essex Sts., plain found., to Lincoln Realty Co., 14 Central Ave. Est. exceeds $150,000.

N. Y., Bayside—Kings Builders, 66 Court St., Brooklyn, 2 story, basement, brick, steel, residential building, 48th Ave. and 217th St., separate contracts. $150,000. B. Dreisler, 153 Remsen St., Brooklyn, archt.

N. Y., Long Island City—G. Lippett, 147 Bway., 6 story, apartment, 34th St. and 31st Ave., separate contracts. $150,000. Private plans.

N. Y., New York—Four Hundred Sixty-One West 44th St. Corp., c/o Wm. Lipman, 615 West 184th St., 6 story, 461 West 44th St. Separate contracts. $150,000. G. G. Miller, 545 Fifth Ave., archt.

CLUBS

PROPOSED WORK

Calif., San Francisco—Olympic Club, Post and Mason Sts., rejected bids club building, Post and Mason Sts. $3,000,000. Project postponed indefinitely. Noted Sept. 25.

N. J., Weehawken—Weehawken Lodge 1456 B. P. O. Elks, H. Bisehoff, pres. Bldg. Comn., Boulevard E. and 6th St., revised plans by W. Mahnken, 26 Journal Sq., Jersey City, F. J. Ricker, 685 Hudson Ave., West New York, associated archt., 2 story, basement, brick, steel, plain found. $150,000. Noted Jan. 22.

BIDS ASKED

N. Y., New York—Cosmopolitan Club, 133 East 40th St., club, 122 East 66th St. $200,000. **Maturity indefinite.** Noted

CONTRACTS AWARDED

O., Canton — Building Com. Odd Fellows Lodge, 3 story, basement, 70 x 165 ft., concrete, brick, steel lodge, to R. E. Schneider, 645 Bellflower Ave. S.W., $150,000. Noted June 18.

HOSPITALS

PROPOSED WORK

Calif., Los Angeles—Queen of Angeles Hospital, 2301 Bellevue Ave., bids in September, 10 story, steel, rein.-con., terra cotta, marble, tile, steam heating, fire escapes, signal system, 2301 Bellevue Ave. $400,000. A. C. Martin, 228 Higgins Bldg., archt. Noted May 28.

Calif., San Francisco—City and San Francisco Co. plans by Coffey & Rist, Phelan Bldg., Psychopathic Institute, rein.-con. $400,000. H. J. Brunnier, Sharon Bldg., engr.

Calif., San Francisco—City and San Francisco Co., plans by Coffey & Rist, Phelan Bldg., 6 story, basement, rein.-con. cancer institute building, Potrero Ave. $400,000. H. J. Brunnier, Sharon Bldg., engr.

Mass., Webster—Webster District Hospital, S. L. Whipple, pres., 824 School St., will not construct brick, steel hospital addition, Thompson St. $150,000 or more. This corrects report in June 11 issue.

Mass., Westboro—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, plans by Desmond & Lord, 1 Beacon St., Boston, and takes bids about Aug. 17, 2 story, basement, brick, steel hospital addition, plain found. $150,000.

N. Y., Brooklyn—Long Island College Hospital, Henry and Pacific Sts., science laboratory and maternity pavilion. To exceed $250,000.

N. Y., Huntington—Owner, c/o Chamber of Commerce, hospital. To exceed $400,000.

N. Y., New York—Dept. of Hospitals, Municipal Bldg., plans by B. R. Swartburg, 2 West 46th St., 2 story, 122 x 174 ft. stores, storage and garage at Welfare Island, opposite 61st St. $150,000.

BIDS ASKED

Idaho, Blackfoot—Aug. 31, by A. Harbour, comr. P. Wks., Boise, general contract mental hospital. $220,000. C. Richardson, Lewiston, archt. Noted July 30.

N. J., Newark—Bd. City Comrs., City Hall, bids about Sept. 1, general contract 2 story, basement, 30 x 110 ft., brick, steel ward and recreation addition, Ivy Hill Almshouse, $200,000. J. T. Rowland, 45 Walnut St., archt. Noted July 16.

N. Y., Princess Bay (sta. Staten Island)—W. H. Hoffman, archt., 26 Bay St., St. George, taking bids 2 story, basement, brick, steel, nurses' home addition, Prince Bay Rd., for Richmond Memorial Hospital, 375 Prince Bay Rd. $150,000.

Ore., Portland—W. E. Kelley, archt., Oregon Bldg., takes bids about Oct. 26, rein.-con., hospital, plain found., Pacific St., for S. E. Clark, Portland. $150,000.

CONTRACTS AWARDED

Mass., Norfolk—Commonwealth of Massachusetts, Dpt. Correction, State House, Boston, to Franklin Bros. Constr. Co., Inc., 30 Mystic Ave., Medford, administration building at State Prison Colony, est. $150,000, receiving building, $258,000, both 3 story, basement, brick, rein.-Con., plain founds. Noted July 23.

Mich., Eloise—Wayne Co., Superintendents of Poor, County Bldg., Detroit, altering and constructing 4 story, basement, rein.-con., brick, steel, stone hospital addition, plain found., to A. W. Kutsche Co., 816 Francis Palms Bldg., Detroit. Est. $350,000. Noted July 23.

N. Y., Middletown — Dpt. Mental Hygiene, State Office Bldg., Albany, reconstructing old main buildings and additional patient and employee accommodations at Middletown State Homeopathic Hospital, to Mark Constr. Co., Commercial Trust Bldg., Phila., Pa., $474,800, heating and sanitary work, to J. T. Evans, Inc., 245 West Market St., Wilkes Barre, Pa., $52,800 and $58,500 respectively, electrical work, to Westchester Electrical Equipment Co., South Bway., Yonkers, $26,975. Grand total $613,-135. Noted June 18.

Okla., Norman—State Board of Affairs, Capitol Bldg., Oklahoma City, 3 story, basement, 38 x 120 x 123 ft., rein.-con., brick, ward building, plain found., to Bailey & Burns, Norman, $136,150. Noted July 23 under "Oklahoma."

Wis., Racine—J. Temme, supt. St. Marys Hospital, general contract 6 story, basement, 218 x 221 ft., brick, steel, rein.con. hospital, to Hutter Constr. Co., Fond du Lac, for Order of Franciscan Sisters, Florissant Rd., St. Louis, Mo. $440,000. Noted July 16.

Que., St. Johns—St. Johns Hospital, two 5 story, 40 x 180 ft. and 45 x 134 ft. brick, steel additions, to A. Deschamps, 117 Mayfair St., Montreal, $300,000.

CHURCHES

PROPOSED WORK

Md., Baltimore—Grace Methodist Episcopal Church, Roland Ave. and Oakdale Rd. soon lets contract 1 story, basement, stone, brick, hollow tile, church and Sunday School, Charles St. and Belvedere Ave. $350,000. Frohman, Robb & Little, 726 Jackson Pl. N.W., Wash., D. C. and W. W. Emmert, Union Tr. Bldg., Baltimore, archt. H. Massart, 328 North Charles St., engr.

Mass., Taunton—St. Mary's Roman Catholic Church, J. J. Shay, pastor, sketches by J. I. Higgins, Borden Bldg., Fall River, altering and constructing convent addition, Broadway. $150,000. Noted July 30.

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Churches (Continued)

Mo., St. Louis—Missouri Diocese of Episcopal Church, c/o Diocesan Office, 1210 Locust St., 1 and 2 story, concrete, brick, stone church, parish house and rectory, Clifton St. between Murdock and Locke Aves. $200,000.

N. J., West New York — St. Peter & Paul Czechoslovak Lutheran Church, J. Zewan, pres., 67 26th St., Guttenberg, N. J., 2 story, basement, brick, steel, plain found. $150,000. Architect not appointed.

N. J., Westwood—Jewish Community, H. E. Selard, chn., Prospect St., revised plans by H. Smith, Bway., Hillsdale, brick, steel synagogue, Washington and St. Nicholas Sts. Former bids rejected. $150,000. Noted Apr. 9.

N. Y., Brooklyn — Parish of Immaculate Heart of Mary, 119 East 4th St., plans by H. V. Murphy, 208 Livingston Ave., 94 x 175 ft. church, Fort Hamilton Parkway and East 4th St. $200,000.

Ont., Ottawa—Knox Presbyterian Church, P. Christie, 50 Powell St., chn. Building Com., plans by J. A. Ewart, Jackson Bldg. and Sproatt & Raiph, 1162 Bay St., Toronto, 1 story, brick, stone, church, Elgin and Lisgar Sts. $250,000.

BIDS ASKED

Calif., Santa Barbara — H. H. Gutterson, archt., 526 Powell St., San Francisco, taking bids rein.-con., steel, tile church, for First Church of Christ Scientist, $150,000. Noted Jan. 22.

Conn., Waterbury—Aug. 15, by West Side Hill Methodist Episcopal Church, R. Shinn, pastor, c/o Bureau of Architects, 1701 Arch St., Phila., Pa., 2 story, basement, brick, stone church and school, plain found. $150,000. Noted July 9.

N. J., Raritan—St. Ann's Roman Catholic Church, bids in November, 1 story, basement, 50 x 105 ft., brick, steel church, plain found., $150,000. DePace & Juster, 151 West 46th St., New York, archts. Noted June 18.

CONTRACTS AWARDED

O., Lakewood (br. Cleveland)—Faith Lutheran Church, J. L. Lippoldt, pastor, 2079 Ridge Rd., Cleveland, 1 story, basement, 50 x 123 ft., brick, stone, Hilliard Rd. and Woodward Ave., to Vogel-Roeper Constr. Co., 4200 Ridge Rd., Cleveland. Est. $150,000.

T. H., Honolulu—St. Andrews Parish, Honolulu, 2 story, rein.-con., Sunday School building to **R. E. Woolsey**, Honolulu, $150,000.

SCHOOLS

PROPOSED WORK

Ark., Conway—Arkansas State Teachers College, H. L. McAllister, pres., sketches, 2 story, basement, rein.-con., brick, stone science hall. $150,000. **Maturity indefinite.**

Conn., Morris—Town, Wm. Kirschberger, chn., sketches by G. A. Quick, 170 Kneeland Rd., New Haven, building, incl. school, library, jail, town offices and community hall. $150,000.

La., Jonesboro—Jackson Parish School Board, W. C. McClendon, secy., plans by J. W. Smith, Monroe, two 2 story, basement, brick, concrete school buildings, one Jonesboro, other in Hodge, $100,000 and $50,000 respectively. Noted July 23.

Md., Baltimore—Pub. Imprvt. Comn., plans 2 new schools, $470,000 and $275,000. Also 2 elementary schools.

Mass., Brookline—Town, O. Gallagher, supt. Schools, physical education unit, Greenough St. $340,000. Architect not appointed.

Mass., Northbridge—St. Peters Roman Catholic Parish, J. H. Gelineau, pastor, sketches brick parochial school. $150,000. Architect not appointed.

Mo., St. Louis—Bd. Educ., 911 Locust St., plans by E. T. Friton, building comr., c/o owner, 3 story, basement, rein-con., brick, stone high school building, incl. 2 gymnasiums, auditorium, on 400 x 509 ft. site, Kingshighway at Arsenal St. $900,000.

N. H., Hooksett—St. Mary's Academy, M. De LaSalle, in charge, sketches by Maginnis & Walsh, Statler Bldg., Boston, Mass., 1 and 2 story, brick chapel and auditorium, Academy Grounds. $150,000.

N. J., Hackensack—Bd. Educ., 355 State St., plans by A. E. Dore, 15 Main St., 2 story, basement, brick, steel, rein.-con., Union St. $210,000. **Maturity indefinite.** Noted July 16.

N. J., Hackensack—Bd. Educ., 355 State St., plans by A. E. Dore, 15 Main St., 2 story, basement, brick, steel, rein.-con., 1st Ward. $150,000. **Maturity indefinite.** Noted July 16.

N. J., Kearny—Bd. Educ., Devon St., altering and constructing 2 story, basement, brick, steel school, Magnolia Ave. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, archts. Project in abeyance. Noted July 9.

N. J., Mahwah—Bd. Educ., Hohukus, 1 story, basement, 80 x 140 ft., school. $150,000. A. J. Rogers & J. Guptill, 55 West 42nd St., New York, archts. Project in abeyance. Noted July 2.

N. J., Moonachie—Bd. Educ., 2 story, basement, brick, steel, rein.-con., junior high school. $150,000. Project abandoned. Noted June 11.

N. J., Morristown—Bd. Educ., O. M. Goble, dist. clk., 50 Early St., 2 story, basement, brick, steel, rein.-con., Mills St. $150,000. **Maturity in November.** Noted May 28.

N. J., Newton—Bd. Educ., High School Bldg., revised plans by Hacker & Hacker, 201 Main St., Fort Lee, 2 story, basement, brick, steel junior high school, plain found., steam heating. $200,000. Noted June 4.

N. J., Paterson—Bd. Educ., City Hall, plans by Lee Hewitt, 152 Market St., Grade School 5, 2 story, basement, rein.-con., brick, steel, plain found., Latrova Ave. $150,000.

N. J., Pompton Lakes—Bd. Educ., c/o C. E. Walton, supervising Principal, Municipal Bldg., revised sketches by Hacker & Hacker, 201 Main St., Fort Lee, 2 story, basement, rein.-con., brick, steel Junior High School, plain found., $230,000. Noted July 2.

N. J., Rutherford—T. J. Folks, archt., 488 East 33rd St., Paterson, 2 story, basement, 100 x 155 ft., brick, steel parochial school, Ames Ave. and Chestnut St., for St. Mary's Roman Catholic Church, C. W. Tichler, 91 Home Ave. $200,000. Project indefinite. Noted July 7.

N. J., Teaneck (br. Hackensack)—Bd. Educ. High School, plans by N. T. Anthoney, 275 Engle St., Englewood, 2 story, basement, brick, steel, rein.-con., school, Garrison Ave. $200,000. Noted Apr. 23.

N. J., West New York—Bd. Educ., Municipal Bldg., sketches 3 story, basement, rein.-con., brick, steel high school addition, Park Ave. $150,000. Architect not selected. **Maturity probably soon.**

N. Y., New York—Bd. Educ., 500 Park Ave., sketches by W. C. Martin, Flatbush Extension and Concord St., Brooklyn, P. S. 107 Bronx, Fetley and Croes Ave. $750,000.

N. Y., New York—Sisters of Jean Baptiste, 184 East 76th St., plans by Robt. J. Reiley, 12 East 41st St., 3 story, convent dormitory, 1087 Lexington Ave. $150,000.

Pa., Phila.—Bd. Educ., E. Merchant, secy., 19th and Ludlow Sts., plans by J. T. Catherine, 19th and Ludlow St., Junior High School, 3 story, basement, 170 x 290 ft., rein.-con., brick, steel, plain found.

BIDS ASKED

Calif., North Hollywood—Sisters of Nazereth taking bids selected list of contractors five 2 story buildings one 150 x 150 ft., one 50 x 60 ft., two 125 x 125 ft., one 60 x 100 ft., rein.-con., art stone, clay tile steel, steal heating, hardwood floors, tile, wrought iron, electric refrigerator, steam heating, boys' school, Magnolia and Sapulveda Blvds. $200,000. I. E. Loveless, 211 Robertson Bldg., Beverly Hills, archt.

Ind., Elkhart—Aug. 21, by School Comrs., 2 story, basement, brick, steel school, steam heating plant. $150,000. W. Ellwood, South Bend, archt.

Mass., Lowell—Aug. 15, by St. Michael's Roman Catholic Parish, J. J. Shaw, pastor, 6th St., c/o J. Flaherty, archt., Green Harbor, 3½ story, basement, brick convent, plain found. $150,000.

Mass., Worcester—Aug. 15, by H. M. Warner, 321 West 44th St., New York, general contract memorial auditorium for Worcester Academy. $250,000. D. Eberson, c/o Warner Bros. Pictures, 321 West 44th St., New York, archt. Noted June 25.

N. H., Bethlehem—Aug. 20, by Bethlehem School Dist., 2 story, basement, 75 x 145 ft., concrete, brick high and grade school, plain found. $150,000. H. H. Owen, 3 North State St., Concord, archt.

N. J., Lakewood—Bd. Educ., bids about Sept. 15, two 2 story, basement, brick, steel schools. $250,000. C. B. Cook, 505 Bond St., Asbury Park, archt. Noted July 30.

N. J., Newark—Owner c/o H. J. Weiler, archt., 40 Kormoran St., bids about Sept. 15, general contract 2 story, basement, brick, steel school addition, Oilver St. $150,000.

N. J., Newark—Bd. Educ., City Hall, bids about October 1, general contract 4 story, basement, brick, steel, junior and senior high school, Chancellor Ave. $1,080,000. Guilbert & Betelle, 20 Branford Pl., archts. Noted June 25.

N. J., Rahway—Bd. Educ., High School, bids about Oct. 1, general contract Junior High School, 3 story, basement, brick, steel, Central Ave. near St. George Ave. $400,000. S. Williams, 146 Irving St., archt. Noted Aug. 6.

N. J., Union City—Bd. Educ., F. Artel, secy., 415 32nd St., bids about Sept. 15, general contract 3 story, basement, 155 x 190 ft., brick steel, rein.-con., West St. from 5th to 6th Sts. $750,000. J. D. Lugosch, 714 Bergenline Ave., archt.

N. Y., West Brighton (sta. Staten Island)—Bd. Educ., 500 Park Ave., New York, bids about Sept. 1, general contract 2 story, basement, brick, steel, P. S. 45, Morrison Ave., between Lawrence and Davis Aves. $300,000. W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, archt.

O., Xenia—Aug. 25, by Bd. Educ., 2 story, brick, rein.-con., school, plain found., Dayton Pike. $180,000. Walker & Norwick, American Bldg., Dayton, archts.

Pa., Pottsville—Sept. 2, by T. T. Daddow, secy. Bd. Educ., 5th and Norwegian Sts., 3 and 4 story, basement, 246 x 401 ft., rein.-con., brick, steel high school. $900,000. W. B. Ittner, Inc., 3615 Olive St., St. Louis, Mo., archt.

CONTRACTS AWARDED

Ark., Arkadelphia—School Dist. 1, 3 story, 206 x 135 ft., rein.-con. brick high school, incl. auditorium, gymnasium, to W. B. Smith, Eldorado, $100,000. Noted June 19.

Ark., Jonesboro—Bd. Trustees Agricultural & Mechanical College, general contract 4 story, basement, 145 x 206 ft., rein.-con., brick, steel, stone administration building, to J. H. Reddick, Ft. Smith, $151,598; plumbing, to Shaw Gas & Plumbing Co., 1401 West 3rd St., Little Rock, $8,473; heating, to Hughes Heating Co., 672 Madison St., Memphis, Tenn., $11,619; electric wiring, to Thompson Electric Co., 63 South 3rd St., Memphis, Tenn., $7,580. Grand total $170,270. Noted July 25.

D. C., Wash.—District Comrs., District Bldg., constructing Benjamin Stoddert School to C. S. Bennett, Phila., Pa., $106,700.

Ind., Campbellsburg—School Commissioners, brick, steel high school building, to C. Cooper, Odon. Est. $150,000. Noted July 23.

Mass., Boston—Most Precious Blood Roman Catholic Church, E. Crowley, pastor, 43 Maple St., 3 story, basement, irregular sized, brick, stone convent, plain found., Hyde Park, to J. J. Powers, 33 Myrtle St., Somerville. Est. $150,000. Noted Mar. 5.

Mass., Fall River—Sacred Heart Roman Catholic Church, E. Carr, 163 Winter St., 3 story, basement, brick, steel, parochial grade school, plain found., to Walsh Bros., 150 Hampshire St., Cambridge. Est. $200,000. Noted June 25.

Mass., Marlboro—Hillside School for Boys, F. Shuman, pres., 453 Washington St., Boston, 3 story, basement, brick administration building and dormitory, plain founds., to T. P. Hurley Constr. Co., 196 Main St. $150,000 or more. Noted Aug. 6.

Minn., Minneapolis—State Comr. Administration & Finance, Capitol, 4 story, rein.-con., brick, stone dentistry building, University of Minnesota, to Standard Constr. Co., 1111 Plymouth Bldg., $294,596. Noted July 16 Daily.

N. H., Exeter—Phillips Exeter Academy, L. Perry, principal, and Cram & Ferguson, archts., 248 Boylston St., Boston, Mass., 3 story, basement, brick inn and conference building, plain founds., to L. H. Shattuck, Inc., 208 Granite St., Manchester. Est. $150,000 or more. Noted Aug. 7.

N. J., Verona—Bd. Educ., High School, general contract 2 story, basement, 60 x 220 ft., brick, steel, to Iorio Contg. Co., Inc., 9 Iorio St., Jersey City, $134,800; plumbing, to West Essex Heating & Plumbing Co., 532 Bloomfield Ave., $8,000; heating and ventilating, to G. Stewart, 270 South 20th St., Newark, $21,488; electrical work, to Friedman Bros., 41 Rose Terrace, Newark, $12,650; steel and ornamental iron, to Globe Iron Wks., 168 West 24th St., Bayonne, $13,800. Grand total $190,738. Noted June 29 Daily.

N. Y., Auburn—Bd. Educ., general contract Senior High School, to Matthew Rauen Co., 326 West Madison St., Chicago, Ill., $448,200; heating and ventilating, also plumbing, to Ryan Plumbing & Heating Co., Watertown, $78,633 and $35,338 respectively; electrical work, to L. W. Keisewatter Co., Utica, $24,295. Grand total $586,466.

N. Y., Fayetteville—School Bd., general contract high school to Fred Brandt Co., 113 Orchard Ave., Syracuse; heating and ventilating to Barr & Creelman, 75 Exchange St., Rochester; plumbing to Shane Constr. Co., Hills Bldg., Syracuse. Noted Aug. 8.

N. Y., Walwick—Commissioner Social Welfare, State Office Bldg., Albany, general contract 25 buildings, and service connections at New York State Training School for Boys, to Boyajohn & Barr, Inc., 299 Front St., Columbus, O., $1,317,722, heating and sanitary work, to J. T. Evans, Inc., 245 Market St., Wilkes-Barre, Pa., $280,000 and $117,000 respectively, and electrical work, to L. A. Feldman, 885 Flatbush Ave., Brooklyn, $177,600. Grand total $1,892,322. Noted July 23.

O., Bexley—Bd. Educ., J. L. W. Henney, clk., 3 story, basement, 345 x 157 ft., concrete, brick, stone junior high school, to R. H. Evans Co., 395 East Broad St., Columbus, $240,260, plumbing, heating and ventilating, to Stai Plumbing Co., 270 East Livingston Ave., $67,321, electrical work, to Electric Power & Equipment Co., 51 East Chestnut St., Columbus, $20,364. Grand total $327,945. Noted July 9.

Wis., Madison—Bd. Educ., F. W. Erickson, secy., general contract 4 story, 70 x 400 ft., brick, rein.-con., steel addition to East High School, to J. H. Findorff & Son, 601 West Wilson St., $293,000; plumbing, to Kerman & Son, 1034 Spaight St., $3,100; lathing, to R. V. Fessenden, 410 Clemmens Ave., $13,950; plastering, to Fix Bros., Route 3, $28,500; painting, to J. H. Tullis, 1027 East Johnson St., $7,900; plumbing, to Pharo Heating Co., 1302 Regent St., $26,072; electric wiring, to Robert Nickles Electric Co., 109 West Main St., $27,317; elevators, to S. Heller Elevator Co., 250 Milwaukee St., Milwaukee, $2,198. Grand total $402,037. Noted May 21.

Ont., Kingston — Queen's University, general contract stone, brick, concrete, steel, arts building, to H. W. Watts, 296 Frontenac St., plumbing, heating, ventilating, to McKelvey Birch, 69 Brock St., Est. $250,000. Noted June 4.

THEATRES

BIDS ASKED

N. J., Englewood — Corporation c/o C. M. Taylor, mgr. Englewood Theatre, 48 East Palisade Ave., bids about Oct. 1, general contract 2 story, basement, brick, steel, plain found., 16 West Palisade Ave. $150,000. Noted July 30.

BANKS

PROPOSED WORK

N. Y., Dunkirk—Lakeshore Natl. Bank, bank Central and 4th Sts. Bids in. **Maturity indefinite.** B. Cunnyngham, 7 Dey St., New York, archt. Noted July 2.

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Banks (Continued).

N. Y., New York—Fifth Avenue Bank of New York, 44th St. and 5th Ave., 3 story, basement, brick, steel, bank, Madison Ave. and 73rd St. $150,000.

N. Y., New York—Manufacturers Trust Co., 55 Broad St., soon lets contract bank addition, 39 Beaver St. $300,000. Godwin, Thompson & Patterson, 19 West 44th St., archts. Noted July 30.

CONTRACTS AWARDED

Tex., Tyler—Citizens Natl. Bank, Tyler, one story, brick terra cotta bank addition and 7 story, annex, to Henger 7 Chambers, Dallas Natl. Bank Bldg., Dallas; terra cotta, to Atlantic & Atlanta Terra Cotta Co., Praetorian Bldg., Dallas. Est. $150,000.

OFFICES

PROPOSED WORK

N. J., Jersey City—Owner, c/o Mahnken & Schultz, 26 Journal Sq., 2 story, basement, brick, steel office and store, $150,000.

N. J., Teaneck—North Jersey Service Corp.-Harol Realty Corp., H. Gilman in charge, Cedar Lane and River Rd., will not build 2 story basement, brick, steel office, store and apartment building Cedar Lane, $150,000. Project abandoned. P. J. Josier, 240 Broad Ave., Palisade Park, archt.

N. J., Union City—See "Stores."

CONTRACTS AWARDED

Calif., Los Angeles — State of California, Sacramento, two 9 story, 50 x 56 ft. rein.-con. wings, to Weymouth Crowell Co., 2104 East 15th St. Est. $607,350. Noted Mar. 5.

Calif., San Francisco—P. F. Burke, c/o W. Magee, 69 Sutter St., 6 story, basement, rein.-con., terra cotta, granite office building, McAllister St., to Barrett & Hilp, 918 Harrison St., $325,000.

Mass., Boston—Professional Arts Building, Inc., W. J. McDonald, 260 Tremont St., superstructure for professional arts building, Trinity Pl., Dartmouth and Stuart Sts. to W. M. Evatt Co., 38 Chauncy St. Est. $4,000,000. Noted Aug. 7, 1930, under Contracts Awarded.

Mass., Pittsfield — Berkshire Mutual Fire Insurance Co., 24 North St., 3 story, basement, brick, concrete, steel, plain found., to D. H. Pike, 30 Eagle St. Est. $150,000.

N. J., Newark—Voorhees, Gmelin & Walker, archts., 101 Park Ave., New York, general contract 2 story, basement, 80 x 105 ft., central office building, to Mahony Troast Constr. Co., 657 Main Ave., Passaic. Est. $150,000. Noted July 30.

STORES

PROPOSED WORK

Ind., Indianapolis — Sears, Roebuck & Co., Arthington & South Homan Sts., Chicago, Ill., plans by Nimmons, Carr & Wright, 333 North Michigan Blvd., Chicago, Ill., 3 story, basement, rein.-con., brick addition, 355 North Alabama St. $150,000.

N. J., Jersey City—Owner, c/o Mahnken & Schultz, archts., 26 Journal Sq., 2 story, basement, brick, steel, stores, office, $150,000.

N. J., Union City—W. P. Keans, 317 Monastery Pl., plans by P. A. Vivarttas, 110 48th St., 2 story, basement, 75 x 100 ft., brick, steel, store and office building, plain found., Bergenline Ave. and 36th St. $150,000. **Maturity in October.** Noted July 16.

N. Y., New York — Henry Gold and One Thousand Fifty Five Southern Blvd. Corp., 41 East 42nd St., New York, 2 story, stores, office, Westchester Ave., Southern Blvd., and Simpson Pl. $150,000.

O., Steubenville—T. E. Loretta, Verne Fisher, 3 story, basement, 72 x 340 ft. terra cotta, stone arcade building incl. shops, offices and parking, North 4th St. $250,000.

BIDS ASKED

N. J., Union City—Mahnken & Schultz, archts., 26 Journal Sq., Jersey City, taking bids 2 story, basement, 70 x 100 ft., brick, steel store, office, Bergenline Ave. and 36th St., for A. Holthausen, 713 Bergenline Ave. $150,000.

PUBLIC

PROPOSED WORK

Ark., Monticello — COURT HOUSE — Bd. Comrs. Drew Co., c/o W. E. Epencer, judge, and Building Comn., soon take bids 3 story, brick, concrete, $150,000. H. R. Burks, Wallace Bldg., Little Rock, archt. Noted Aug. 6.

Calif., Oakland—EXPOSITION—City Council, sketches exposition building, $150,000. Architect not appointed.

Calif., Santa Barbara—SCIENCE—State Dpt. P. Wks., Sacramento, rejected bids July 21, 3 story, rein.-con science building. Noted July 9.

N. J., Bayonne — MUNICIPAL — Bd. City Comrs., City Hall, W. P. Lee, city clk., revised sketches by P. A. Vivarttas, 110 48th St., Union City, 4 story, basement, rein.-con., brick, steel, plain found., Avenue C between 27th and 28th Sts. $150,000. Noted Oct. 16.

N. Y., Brooklyn—MUSEUM—Brooklyn Institute of Arts & Sciences, and H. Hesterberg, pres. Brooklyn Boro, Boro Hall, bids about October, general contract altering and constructing museum addition, Eastern Parkway and Washington Ave. $265,000. McKim, Mead & White, 101 Park Ave., New York, archts. Noted June 4.

N. Y., Elmhurst—COURT HOUSE—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., court house, $225,000. **Maturity late in winter.** Noted June 4.

Tex., Waco—DORMITORY—State Bd. Control, C. Teer, chn., Austin, plans by T. Brooks Pearson, 1st State Bank Bldg., brick, rein.-con. dormitory for negroes, plain found.

Wyo., Evanston — EMPLOYEES — State Bd. Charities & Reform, Cheyenne, rejected bids employees building.

BIDS ASKED

Minn., Rochester—CITY HALL—Aug. 20, by City, 2 story, basement, brick, stone, rein.-con. city hall with wing for jail, $180,000. J. McG. Miller, Rochester, archt. Noted May 7.

Neb., Lincoln—MUNICIPAL—Aug. 18, by City, T. H. Berg, clk., 3 story, basement, 93 x 192 ft. brick, rein.-con., Hay Market Sq., between 10th and Q Sts. $150,000. Davis & Wilson, 525 South 13th St., archts. Noted Aug. 6.

N. Y., Jamaica—CHILDREN'S COURT—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., Long Island City, bids about Aug. 20, general contract children's court house, $200,000. Noted Jan. 22.

CONTRACTS AWARDED

Mass., Newton—MEMORIAL—City of Boston, 2 story, basement, memorial building, Commonwealth Ave., to M. S. Kelleher Co., 10 High St., Boston, $158,000; heating to George E. Soar Co., 263 Harrison Ave., Boston; plumbing to J. S. Cassedy, 133 Austin St., Cambridge; electrical work to Edwin C. Lewis Co., Federal St., Boston, est. $25,000. Noted July 2 under "City Hall."

Mass., Newton—CITY Hall— City, 2 story, basement, brick, limestone, steel city hall, plain found., Commenwealth Ave., Walnut and Homer Sts., to Crane Constr. Co., 80 Boylston St., Boston, $327,000; electrical work to Edwin C. Lewis Co., 121 Federal St., Boston, $26,250; heating to George E. Soar Co., 263 Harrison Ave., Boston, $32,995; plumbing to W. H. McKenna Co., 79 Chestnut St., Boston, $13,745. Grand total $399,990. Noted July 2.

Tex., Wellington—COURT HOUSE—Berry & Hatch, archts., 414 Oliver Eagle Bldg., Amarillo, 3 story, basement, 76 x 110 ft., brick, rein.-con.; terra cotta, court house to Christy-Dolph Constr. Co., Constr. Indus. Bldg., Dallas, $108,889; plumbing and heating to Cullyford Co., Amarillo, $10,760; electric wiring to Broome Electric Co., Amarillo, $6,185 for Collingsworth Co., c/o E. Brown, judge. Grand total $125,834. Noted July 16.

UNCLASSIFIED

PROPOSED WORK

Calif., Los Angeles—HOME for AGED—Eastern Star Home of California, c/o Train & Cressey, Western Mutual Life Bldg., archts., rein.-con., Beverly Blvd. $250,000.

Calif., Pomona — NEWSPAPER — Pomona Progress-Bulletin, 3rd and Thomas Sts., plans by L. Rogers, 2412 West 7th St., Los Angeles, 3 story, basement, 119 x 120 ft., rein.-con., tile, plaster, aert stone, steel, plate glass, metal store fronts, tile, marble, wrought iron, freight elevator, passenger elevators, gas heating, 3rd and Thomas Sts. $200,000. E. W. Cunningham, 1333 North Louise St., Glendale, engr.

Mo., St. Louis—STATION and OFFICE—Midwest Industrial Development Co., subsidiary Illinois Terminal R.R. Co., A. P. Titus, vice-pres., 1221 Locust St., plans by Mauran, Russell & Crowell, Chemical Bldg., (1st unit) 11 story (ultimately 20 story), basement, sub-basement, 122 x 137 ft., rein.-con., brick, steel, stone, 12th St. and Washington Ave. $1,500,000.

Neb., Lincoln—NEWSPAPER PLANT—State Journal Co., 9th and P. Sts., J. C. Seacrest, pres., plans by Davis & Wilson, 525 South 13th St., 4 story, basement, 75 x 142 ft., rein.-con., brick, stone, L and 13th Sts.

N. H., Nashua—STATION—Boston & Maine R.R. Co., 150 Beverly St., Boston, W. J. Backes, ch. engr., plans railroad station, Main St. $150,000.

BIDS ASKED

Ind., Indianapolis—WAR MEMORIAL—Aug. 26, at office Trustees Indiana World War Memorial, American Legion Bldg., 777 North Meridian St., M. A. Sonntag, pres., interior finishing Building A, incl. marble, vari-colored marble pillars, rounded ceiling with bas relief work, $1,000,000, also dark green granite cenotaph, flag pole, in Outlots 5 and 36. $45,000. Walker & Weeks, 2341 Carnegie Ave., Cleveland, O., archts.

R. I., Cranston (mail Providence)—REFORMATORY—Aug. 31, by State Dpt. P. Welfare, State House, Providence, 3 story, basement, 40 x 150 ft. and 80 x 80 ft., brick, steel, plain found., off Pontiac Ave. $500,000. C. E. Blais, Howard, engr. Noted June 4.

CONTRACTS AWARDED

N. H., Manchester—ORPHANAGE—St. Peters Orphanage, Alsace and Kelley Sts., 4 story, 60 x 115 ft., and 20 x 50 ft., brick, steel, to O. Perry, Willow St. Est. $150,000.

O., Cincinnati — NEWSPAPER — Cincinnati Times Star Publishing Co., 6th and Walnut Sts., 18 story, basement, subbasement, 135 x 228 ft., rein.-con., brick, limestone, plain found., to Ferro Constr. Co., 3rd and Elm Sts., $1,800,000. Noted July 23.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., Long Beach—COKE PLANT—Fields Chemical Corp., 1202 Financial Center Bldg., sketches metallurgical coke plant, 20 ton per day capacity.

Calif., Los Angeles—FACTORY—Loose-Wiles Biscuit Co., 1100 West 8th St., Kansas City, Mo., sketches 1st unit 1 story, 80 x 260 ft., other units 5 or 6 story, 150 x 260 ft. factory buildings, Gage Ave.

Mass., Falmouth—BAKERY—A. G. Cook, Main St., plans 1 and 2 story, bakery, Main St. $45,000. Private plans.

Neb., South Sioux City—ICE PLANT—Central West Public Serv. Co., Julious Malory, 3rd and Weley Way, Sioux City, rebuilding rein.-con., brick ice plant destroyed by fire. $100,000.

N. J., East Rutherford — FACTORY — East Rutherford Syringe Co., 75 Mozart St., 2 story, basement, brick, steel syringe factory, Mozart St. $40,000. J. T. Camlet, 26 Piaget Ave., Clifton, archt. Noted June 25.

N. J., Newark—LAUNDRY—Amer. Realty & Investment Co., c/o New Jersey Toilet & Towel Supply Co., 69 New St., will not build 2 story, basement, brick, steel laundry, plain found., 9-23 Brainfort St. $40,000. Project abandoned. Noted July 30.

N. J., Trenton—PLANT—C. V. Hill & Co., Pennington Ave., plans porcelain plant, $50,000. Architect not appointed.

N. Y., Honeywood (sta. Staten Island)—GAS PLANT—New York and Richmond Gas Co., 691 Bay St., St. George, plans 1 story, brick, steel, illuminating gas plant, Sycamore St. and Richmond Ave. $40,000. Private plans.

N. Y., New York—FACTORY—Kohler & Campbell, 627 West 50th St., takes bids in September altering factory, incl. elevators, elevator shafts, 627 West 50th St. $40,000. Ross & McNeil, 274 Madison Ave., archts. Noted June 25.

N. Y., New York — LIGHT MANUFACTURING—Mesfree Realty Corp., 570 7th Ave., soon lets general and separate contracts, light manufacturing, elevators, motor room, etc., 134 West 37th St. $40,000. W. C. Sommerfeld, 31 Union Sq., archt.

N. Y., New York—BAKING PLANT—National Biscuit Co., 449 West 14th St., plans plant addition. To exceed $500,000. **Maturity about November.** Private plans. Noted May 21.

O., Cleveland—FACTORY—Smolensky Valve & Fitting Co., M. Smolensky, pres., 1931 West 47th St., 3 story, basement, 40 x 100 ft., brick, steel, incl. warehouse, Broadway. $40,000. Private plans.

O., Liverpool—FACTORY—Patterson Foundry & Machine Co., brick unit to house new power plant for use of 3 factories, 3 generating units. St. George St. $75,000. Private plans.

O., Youngstown — BAKING PLANT — Great Atlantic & Pacific Tea Co., 4224 Market St., 3 story, basement, 100 x 200 ft., brick, steel, concrete, $300,000. Private plans.

O., Youngstown—BAKERY—Cook & Canfield, archts., City Trust Bldg., soon takes bids 3 story, basement, rein.-con., plain found., Hubbard Rd., for Watson Terminal and Warehouse Co., Dollar Trust Bldg. $300,000.

Tex., Corpus Christi—CHEMICAL PLANT—Southern Alkali Corp., c/o American Cyanamid Co., 535 5th Ave., New York, and Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh Pa., chemical plant. $10,000,000. **Maturity in November or later.** Noted May 21.

Tex., Refugio—GASOLINE REFINERY—G. P. Shelton, et al., Tulsa, Okla., plan gasoline refinery plant, 10 m. cu. ft. d.c., Refugio Field near here. $150,000. Private plans.

Vt., St. Johnsbury—PUBLISHING PLANT—Caledonian-Record Publishing Co., 107 Eastern Ave., 1 story, publishing plant, $40,000. Project in abeyance until spring. H. H. Owen, 3 North State St., Concord, N. H., archt. Noted July 16.

Ont., Wallaceburg—PLANT—Canadian Fertilizer Co., S. J. Smith, mgr., 1 story, 75 x 300 ft., 45 ft. high, steel, concrete plant. $50,000. Private plans.

BIDS ASKED

Conn., Ansonia — MILL — See "Contracts Awarded."

Mass., Gloucester — LAUNDRY — See "Contracts Awarded."

N. J., Allwood—PLANT—Ballinger & Co., archts. and engrs., 12th and Chestnut Sts., Phila., Pa., bids about Aug. 15, 2 story, basement, brick, steel plant, plain found., steam heating, for American Colortype Co., 207 West 25th St., New York. $40,000. Noted July 16.

N. J., Garfield—LAUNDRY—F. Sciortino and V. Lamendola, Main St., bids about Sept. 15, on revised plans 1 story, basement, brick, steel, laundry plant, Division Ave. $40,000. A. L. Vighante, 40 Passaic St., Garfield, archt. Noted June 4.

N. J., Newark—FACTORY—See "Contracts Awarded."

N. J., Rutherford—FACTORY—Owner, c/o F. Pirrone, archt., 104 Midland Ave., Garfield, bids about Sept. 1, general contract 2 story, basement, brick, steel, rein.-con., factory addition. $50,000.

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Factories and Mills (Continued)

Tex., Seymour—REFINERY—See "Contracts Awarded."

W. Va., Wellsburg—FACTORY—Pillsbury Flour Co., 302 Metropolitan Life Insurance Bldg., Minneapolis, Minn., takes bids about Sept. 5, 1 story, 33 x 70 ft., brick, steel, concrete addition to flour sack factory. East St. $40,000. Private plans.

B. C., Vancouver—RICE MILL—Aug. 15, by Creer & Alden, engrs., 920 Rogers Bldg., 4 story, rein.-con. rice mill, pier and warehouse, small office building, Lulu Island, for Canada Rice Mills, Ltd., 343 Railway St. $100,000. Noted May 14.

CONTRACTS AWARDED

Calif., Los Angeles—CONVERTING PLANT—Crown Willamette Paper Co., 220 South Los Angeles St., 2 story, 193 x 315 ft., steel, Monitor type, converting plant for manufacture of paper, incl. warehouse, office, 12th and Evergreen Sts. in Hostetter Industrial Dist., to Austin Co. of California, 777 East Washington St. Est. $300,000.

Calif., Los Angeles—FACTORY and OFFICE—Curtis Mfg. Co., 405 Land Mortgage Bldg., 1 story, 57 x 200 ft., brick, steel, concrete, to L. L. Locke, 3359 Sunnyside Dr. Est. $200,000. Noted Aug. 6.

Conn., Ansonia—MILL—American Brass Co., Waterbury, 2 story, timber, concrete mill addition, plain found., Canal St., day labor. $40,000. Private plans.

Ga., Trion—TEXTILE PLANT—Trion Co., Trion or Riegel Textile Corp., 342 Madison Ave., New York, textile manufacturing plant, to A. K. Adams, 542 Plumb St., N. W., Atlanta. To exceed $200,000.

Ill., East St. Louis—FERTILIZER PLANT—Virginia Carolina Chemical Co., Richmond Trust Bldg., Richmond, Va., plant, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. exceeds $40,000.

Ind., Jeffersonville—FACTORY—M. Fine & Sons, general contract 50 x 115 ft., brick, steel, Spring and Ohio Sts., to H. A. Doll, 114 Lexington Rd., Louisville, Ky. Est. $40,000.

La., New Orleans — FACTORY — A. M. Lockett & Co., Ltd., five 1 story, brick, steel buildings, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $100,000.

Mass., Brockton—MANUFACTURING—Taunton Lumber Co., 243 North Montello St., altering and constructing addition to T. F. Crowell & Sons, 19 South St. $50,000. Noted Nov. 6 under "Warehouses."

Mass., Canton—FACTORY—Plymouth Rubber Co., Inc., Revere St., altering and constructing 2 story, brick, timber, concrete addition, to Factory 9, to Platt Constr. Co., 711 Main St., Waltham. $40,000.

Mass., Gloucester — LAUNDRY — J. Connor, Burnham St., 2 story, brick, plain found., Burnham St., separate contracts. $40,000. Private plans.

Mich., Detroit—FACTORY—Mechanical Handling Systems, Inc., 3454 Donton St., 1 story, concrete, brick, steel, to The Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $100,000.

Mo., Joplin—STOCK YARDS—Joplin Stock Yards, Inc., L. P. Buchanan, pres., 1161 West 5th St., 1 story, 60 x 115 ft., concrete, brick office, 1 story, 33 x 60 ft. hotel brick filling station, stock pens, 2 trailer unloading docks, loading and conveying equipment. $100,000, owner builds.

N. J., Newark—FACTORY—G. M. Griffith, 54 Lyons Ave., 1 story, basement, brick, steel addition, 39-41 Hamilton Ave., separate contracts. $40,000. Private plans.

N. Y., New York—FACTORY and STORAGE—P. J. Kennedy & Sons, 44 Barclay St., altering manufacturing and storage building, incl. elevator, plumbing, heating, to P. M. Sterling, 230 Park Ave. Est. $40,000. Noted July 2.

N. Y., New York—MANUFACTURING—Pustet & Co., 52 Barclay St., elevators, plumbing, heating, etc., for manufacturing and storage building, to Paul M. Sterling, 230 Park Ave. Noted June 25.

N. C., Asheboro—FURNITURE PLANT—Cranford Furniture Plant, 2 story, brick, steel, to C. Wood, Asheboro.

O., Cincinnati — FACTORY — Schell Leather Goods Co., 1015 Race St., 2 story, basement, 100 x 100 ft. rein.-con., brick, plain found., Central Parkway, to Parkway Constr. Co., 300 Provident Bank Bldg., $40,000.

Pa., Aspinwall—PLANT—Natural Torch Tip Machine Co., 125 Washington Blvd., Pittsburgh, 1 story, 50 x 75 ft. and 12 x 17 ft., brick, tile, steel, concrete, limestone, concrete slab roof deck, Freeport Rd., to F. K. West & Co., 1235 Washington Blvd., Pittsburgh. Est., $40,000.

Pa., Coraopolis—REFRIGERATING PLANT—Canfield Oil Co., L. Carruth, pres., 620 4th Ave., 2 story, basement, 16 x 50 ft., brick, steel, concrete, 4th Ave., to J. Wasum, 1138 Vance Ave. Est., $40,000.

Pa., Pittsburgh—STONE CUTTING PLANT—Pittsburgh Cut Stone Co., 5116 Cypress Ave., general contract 1 and 2 story, 171 x 200 ft., brick, steel, limestone, metal siding, concrete floor, wood and steel trusses roof, to F. Hoffman Co., 901 Wood St. Noted July 16.

Tex., Longview—CRUDE OIL REFINERY PLANT—Dancinger Oil & Refining Co., Pampa, crude oil refinery plant 2 mi. from here, to Southwestern Eng. Co., Longview, $200,000.

Tex., San Carlos—PACKING PLANT—Texas Citrus Growers Assn., Mission, 1 story, basement, 135 x 160 ft., hollow tile, stucco, citrus packing plant, to A. Velton, Brownsville.

Tex., Seymour—REFINERY—J. Harris and J. R. Fowler, 300 bbl. capacity oil refinery. Day labor. $50,000. Private plans.

GARAGES

PROPOSED WORK

Mass., Brighton (sta. Boston)—City, Dpt. P. Bldgs., soon takes bids 1 story, concrete police station 14. $40,000. J. M. Gray, 175 High St., Boston, archt. Noted July 23.

N. J., Union City—Owner, c/o J. G. Holmes, archt., 147 Summit Ave., sketches 2 story, basement, brick, steel garage, 14th St. $150,000.

N. Y., Astoria—Queensboro Dairy Co., 42nd St., sketches by R. Shutkind, 147 4th Ave., New York, 1 and 2 story, garage and service station, 41st St. and 35th Ave. Est. exceeds $40,000.

N. Y., New York—Dpt. Water Supply, Gas & Electricity, Municipal Bldg., bids late in fall or winter, general contract service garage, 155th St. and St. Nicholas Ave. $69,000. J. E. Kleist, 25 West 45th St., archt.

N. Y., New York—J. S. Kahn, 285 Madison Ave., plans by W. Shary, 22 East 17th St., 3 story, 92 x 100 ft. service garage, 537 West 20th St. $115,000.

N. Y., New York—Owner c/o H. E. Ely Co., 76 William St., plans 3 story, service garage, 537 West 20th St.

O., Cleveland—City, D. E. Morgan, city mgr., plans by H. Kregelius, 504 City Hall, 1 and 2 story, concrete, brick, steel repair shop and garage shop, Clark and Pershing Aves. $50,000.

BIDS ASKED

Mass., Brighton (sta. Boston)—Aug. 25, by City of Boston, Dpt. P. Buildings, 1 story, concrete garage at Police Station 14. $40,000.

CONTRACTS AWARDED

Ind., Indianapolis—Grinsdale Constr. Co., 607 Peoples Bank Bldg., brick, steel super service station, State St. and Pleasant Run Blvd., owner builds. Private plans. $40,000.

Mo., Springfield—State Hy. Dpt., Jefferson City, concrete, brick Division garage, to Forcum-James Co., Dyersburg, Tenn. $33,000.

N. Y., New York—Sidlo Realty Co., c/o L. Silver, pres., 391 East 194th St., 2 story service garage, Webster Ave. and Mosholu Parkway, to Harmad Contg. Corp., 1480 Southern Blvd. Est. exceeds $40,000. Noted Jan. 22.

SHOPS AND FOUNDRIES

PROPOSED WORK

Que., Montreal—FOUNDRY and STEEL PLANT—American Manganese Steel Co., 333 North Michigan Ave., Chicago, Ill., and 230 Park Ave., New York, plans foundry and steel plant on St. Lawrence River. $2,000,000. **Maturity indefinite.**

BIDS ASKED

Mass., Worcester—SHOP—Aug. 19, by City, S. H. Brooks, Jr., supt. sewer dpt., 3 story, 50 x 175 ft., brick, steel shop, East Worcester. $150,000. R. C. Gorrani, 175 Green St., archt. Noted Apr. 9.

POWER PLANTS

PROPOSED WORK

Mass., Palmer—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, soon takes bids heating plant, Monson State Hospital. $300,000. E. C. Brown Co., 77 Summer St., Boston, engr. Noted July 2.

N. J., Orange—See "Waterworks."

Tex., Columbus—Central Power & Light Co., c/o E. B. Neiswanger, Alamo Nat'l. Bank Bldg., San Antonio, dam, electric power development on Colorado River. Company Eng. Dept.

BIDS ASKED

Calif., Hilmar—See "Contracts Awarded."

Ky., Louisville—See "Contracts Awarded."

N. H., Concord—New Hampshire, W. A. Stone, purch. agt., State House, taking bids brick, concrete power plant. $40,000. R. D. Kimball Co., 6 Beacon St., Boston, Mass., archts. Noted July 16.

N. Y., Geneseo—Sept. 1 (extended date), by Commissioner Dpt. Education, Education Bldg., Albany, additional boiler and service connection, for New York State Normal School; adv. E.N.-R. Aug. 13. Noted July 30.

Tex., Crystal City—City taking bids erecting, equipping electric light plant. Bond issue for municipal plant will be called later. Address City Engineering Dpt.

CONTRACTS AWARDED

Calif., Hilmar—Turlock Irrigation Dist., A. M. Sorensen, secy., substation to serve 50 sq.mi., incl. 3 transformers, 1,000 kva. capacity load. Owner builds day labor.

Calif., Vernon—City Council, furnishing, installing generating equipment for complete power plant equipment, incl. 5 Diesel engines electric generating units of 6,000 kw. capacity each, to Hooverp-Owens—Rentschille Co., Hamilton, O., $1,600,000. Rebuilding power plant under supervision H. S. McCurdy, City Hall.

Ky., Louisville—Louisville Gas & Electric Co., 311 West Chestnut St., will build 26 x 31 ft. brick substation housing 1,000 kw. Mercury Arc Rectifier, Young St. north of Payne St.; substation, 25,000 kw. power transformer, no building 7th St. between 11th and 12th Sts; additions, improvements to existing sub-stations, Stevens Ave. west of Bardstown Rd.; 8 mi. 56,000 volt high transmission line from Ohio Falls hydro-electric plant to new 7th St. sub-station, own forces. Est. $500,000. T. B. Wilson, pres.

N. Y., Geneva—Commissioner Educ., Education Bldg., Albany, tunnels for chemical building at New York State Agricultural Experiment Station to J. A. Williams, Catherine St., Utica, $5,890; heating, to W. W. Wetmore, Delaware Ave., Buffalo, $23,199. Noted June 25.

Okla., Supply—Board of Affairs, Capitol Bldg., Oklahoma City, 2 story, 42 x 100 ft., rein.-con., brick power plant, plain found., to C. M. Dunning Constr. Co., 420 North Hudson St., Oklahoma City, $146,140. Est., $150,000.

S. D., Aberdeen—State, J. Berg, engr., Pierre, boiler to Commonwealth Electric Co., 417 Board St., St. Paul, Minn., $36,469; piping, to Kelley Plumbing & Heating Co., Aberdeen, $22,200; coal handling equipment, to Stearns Conveyor Co., 454 Builders Exch., Minneapolis, Minn., $12,489. Grand total $71,158. Revising plans for boiler and engine house. Noted July 2.

Vt., Bennington—State, General H. T. Johnson, Montpelier, 1 story, brick, steel, concrete heating plant at Soldiers Home, to M. J. Burrington, Jr., 495 Main St. Est. $40,000. Noted July 2.

WAREHOUSES

PROPOSED WORK

Calif., Bay Point—Interests, represented by A. H. Feasey, 210 Clara St., San Francisco, sketches warehouse and pier. $350,000 or more.

Kan., Topeka—Fleming-Wilson Mercantile Co., 116 Kansas Ave., soon lets contract 1 story, basement, 160 x 160 ft., concrete brick, steel, incl. large refrigerating plant and cold storage rooms, Euclid Ave. and Santa Fe R.R. $100,000. Austin Co., 510 North Dearborn St., Chicago, Ill., engrs.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., plans by W. H. Gompert and K. M. Murchison, 101 Park Ave., 3 story, storehouse, refrigeration, elevators, etc., at Bellevue Hospital, 420 East 29th St. $40,000.

N. Y., New York—Lincoln Warehouse Corp., 1187 3rd Ave., warehouse, bank, office, 201 East 64th St., $500,000. **Maturity in February.** G. S. Kingsley, 103 East 125th St., archt. Noted June 11.

N. Y., New York—Sofia Bros., 4396 Bway., warehouse addition, 4396 Bway. To exceed $150,000. **Maturity after January.** Architect not appointed.

BIDS ASKED

N. J., North Bergen — Owner, c/o C. G. Eicholtz, Jr., archt., 960 Bergenline Ave., bids about Sept. 15, 4 story, basement, 65 x 120 ft., brick, steel warehouse and showroom addition, Hudson Blvd. $150,000. Noted July 23.

CONTRACTS AWARDED

Conn., Hamden (br. New Haven)—National Biscuit Co., L. & S. Realty Co., 178 Goffe St., New Haven, 1 story, 70 x 170 ft., brick, cast stone, food warehouse, Dixwell Ave. to National Constr. Co., 152 Temple St., New Haven. Est. $60,000.

Mass., Brockton—Ralph E. Baker Furniture Co., 69 Center St., 2 story, 40 x 170 ft., brick warehouse, 604 Main St., to R. S. Edlund, 122 Hillberg Ave. Est. $40,000.

Mo., St. Louis—Midwest Industrial Development Corp., c/o A. P. Titus, vice-pres. Illinois Terminal R.R., Shell Bldg., found. for 12 story, basement, sub-basement, rein.-con., brick warehouse, 1212 Franklin Ave., to G. L. Tarleton, Ambassador Bldg., $50,000.

B. C., Vancouver—Barber-Ellis, Ltd., 1206 Homer St., 3 story, basement, 50 x 120 ft., rein.-con., stucco, steel warehouse, to Snider Constr. Co., Ltd., 637 Granville St., $60,000. Noted June 11.

Ont., Iberl—Imperial Tobacco Co., Ltd., 3810 St. Antoine St., general contract, 1 story, 101 x 550 ft., brick, corrugated iron, concrete, warehouse in connection with plant, plain found., to G. H. Emery Constr. Co., Dawler Bldg., Windsor. Est. $60,000.

Business Opportunities

Projects on which services of consulting engineers, engineers or architects will be required.

Iowa State Bd. of Health orders municipality to build a sewage disposal plant for prevention of stream pollution. Engineer not appointed.

Fire destroyed a large packing and cold storage plant in Laclede, Mo., July 29, loss estimated at $100,000. Owner will reconstruct the plant.

Mill at Harrisburg, Ill., destroyed by fire July 31. Estimated loss $100,000. Owner plans to rebuild at once.

Fire destroyed a sawmill in Metropolis, Ill. Aug. 3, approximate loss $50,000. Owner plans to rebuild.

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See proposal advertising on page 81